ARTOTYPE. B. BIERSTADT, N. Y.

PYRRHA, 3d, 11850.
FARMERS MAID, 13219.
JEWELL BEAUTY, 2d. 1701.

ROSEBELL, 2d. 11722. LADY MADELINE, 10526.
SURPRISE OF M S. 10928.
DANDELION, 2521. DANDY BOY, 7834.
DANDELION, 3d. 21889. DANDELION, 4th. 27000.

"HOLLY GROVE" HERD.

JOHN I HOLLY, Plainfield, N J

JERSEY CATTLE

IN

AMERICA.

BY

JOHN S. LINSLEY, M.D.

"And I, contented with a humble theme,
Have poured my stream of panegyric down
The vale of Nature, where it creeps and winds
Among her lovely works, with a secure
And unambitious course, reflecting clear,
If not the virtues, yet the worth of brutes."

NEW YORK:
BURR PRINTING HOUSE,
18 JACOB STREET.
1885.

TO

THE MEMBERS

OF THE

AMERICAN JERSEY CATTLE CLUB,

THROUGH WHOSE DISCERNMENT AND ENTERPRISE WISE PROVISION HAS BEEN MADE TO SECURE TO THE AGRICULTURISTS OF AMERICA THE PERPETUITY AND PURITY OF THE UNRIVALLED BREED OF JERSEY CATTLE, THIS VOLUME IS RESPECTFULLY INSCRIBED.

JOHN S. LINSLEY.

ERRATA.

Page 10, SALT UNDISSOLVED IN BUTTER.................. 408

Page 270, MAY.

1st line, 15 lbs. Best Mixed Hay.

Page 271, JUNE.

2d line, 20 lbs. Green Rye or Rye Grass.

Page 271, SEPTEMBER.

3d line, 30 lbs. Green Barley.

4th line, 20 lbs. Millet.

5th line, 20 lbs. Wheat.

Page 272. OCTOBER.

3d line, 50 lbs. Green Barley.

4th line, 10 lbs. Green Wheat.

DECEMBER.

1st line, 20 lbs. Best Early Hay.

JANUARY.

1st line, 10 lbs. Green Oat Hay.

Page 273, FEBRUARY.

2d line, 15 lbs. Green Millet Hay.

MARCH.

1st line, 10 lbs. Green Clover Hay.

APRIL.

1st line, 15 lbs. Green Millet Hay or 50 lbs. Green Rye.

A CHEAP WINTER RATION.

1st line, 20 lbs. Green Corn Stover.

Page 274, STANDARD WINTER RATION.

2d line, 10 lbs. Rowen Hay.

Page 275, RATION ONE MONTH BEFORE CALVING.

1st line, 15 lbs. Best Timothy Hay.

OR THIS.

1st line, 15 lbs. Rowen Hay.

BUTTER TESTS.

Page 653, Fillpail 2d 24,388..26 lbs. 2 oz.

JERSEY FOUNTAINS.

HOMER H. 3683 omitted from page 565, Page 742.

PREFACE.

The object of this work is to set forth fully and clearly the special merits and rare qualities of the beautiful breed of Jersey cattle; to show how these qualities have been developed, their mode of perpetuity, and their still further possible improvement.

It is intended to be thoroughly practical and progressive, as well as suggestive of a higher standard in all that pertains to agriculture, cattle-breeding, and the arts of dairying.

In a work treating of such a wide variety of topics, it has been necessary to consult many authors and make numerous studies and compilations.

The author has drawn from the writings of many eminent authorities, including the *Encyclopædia Britannica;* Morton's *Encyclopædia of Agriculture; Chambers' Encyclopædia; Reports of Connecticut Experiment Station; Reports of New York Experiment Station; Reports of Agricultural Bureau, Washington, D.C.; The Marriage of Near Kin,* by Alfred Henry Huth; *The Butter Tests of Jersey Cows,* by Campbell Brown; *Feeding Animals,* by E. W. Stewart; *Guenon on Milch Cows,* by Thomas J. Hand; *The Atmospheric System,* by Thomas B. Butler; *The Country Gentleman; The Jersey Bulletin; The New York Tribune;* the writings of J. Le Couteur, John Thornton, and George E. Waring, Jr.; also the sale catalogues and herd catalogues of breeders.

Acknowledgment is made of the kindness of Major Henry E. Alvord, manager of Mr. Valentine's Houghton Farm at Mountainville, N. Y., for reports and chemical tests. Special thanks are due to the hearty and substantial support of all those who have contributed portraits of cattle to illustrate the text, and butter records, and render the work attractive to lovers of the Jersey.

The medical and sanitary treatment herein suggested, the author hopes, may be the means of saving the lives of many valuable animals.

John S. Linsley, M.D.

New York, April, 1886.

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INTRODUCTORY.

OUR DOMAIN.

The American people are now preparing a continent to be the dwelling-place, before another century shall have passed, of more than five hundred millions of people.

To us the nations of the earth are looking for the solution of many of the problems of political and social economy and questions that relate to the welfare of the human race.

One of the most important elements determining our material prosperity and our permanent progress is an enlightened system of agriculture.

By the condition of a nation's agriculture we may judge of its advancement in the path of civilization.

Not yet is the Golden Age of American Agriculture.

Looking backward to the austere and gloomy barbarism of our Anglo-Saxon ancestry, beyond a thousand years ago, we exclaim, How great the transition! Looking at the progress of a century, or a generation, we are filled with self-gratulation.

But when we consider how much we lack, in knowledge, in method, in purpose—when we try to picture the possibilities of the future of American agriculture, we are impressed with the idea that we are only at the threshold of the way of enlightenment and progress.

In the contest of wresting from the soil an abundant supply of food, clothing, and all the necessaries of physical existence, and at the same time means of leisure, cultivation, refinement, and mental growth for the multitude, we are required to deal with a problem which has not yet been solved. At the very beginning of study we are forcibly convinced of the wastes that are continually draining the resources of a nation—waste of vital force in a thousand ways, waste of material from negligence or from ignorance, waste through unprofitable labor and lack of system.

In our agriculture we need new ideas and new methods. We must apply the lessons we have learned from history and from experience. We must also learn to anticipate the wants of the near future.

There must be an economy of vital force, a profitable system of fertilizing, more thorough tillage, improved sanitary buildings for the farmer and his cattle, and a

practical system of education in all schools, from the primary to the university. But, at last, the basis of our agriculture consists in the races of cattle we cultivate. Without cattle it would be impossible to have any civilization. The cattle must fatten the ground and feed the race of men that live upon it. Agriculture is the mother of all arts, and the cow is the mother of agriculture. Not only are cattle the essential element upon which agriculture depends for existence, but a progressive agriculture requires that the races of cattle adopted by a people must be of the highest excellence to insure prosperity.

In the promotion of this most important but most neglected of all human industries, it is the patriotic duty of every successful business man to devote a portion of his wealth.

The inventor, poet, physician, artist, merchant, miner, lawyer, statesman, soldier, editor, banker, manufacturer—each and all that have accumulated a competency, should hold a portion of the soil for a cultivated farm, a home which should be made as productive and as beautiful as possible, a veritable Paradise, with fruitful fields, orchards, and groves, and herds of the choicest cattle.

As Americans we rejoice in the memory of our famous men, and that many of the best of them were farmers. Washington, Jefferson, the inventor of the first mould-board plow upon mathematical principles; Clay, Webster, Greeley, the great editor; Bryant, the poet; Garfield, the beloved President, and many more whom we love, revere, and honor, have left us a wholesome and worthy example of doing what they could for agriculture. They loved the country home and its pure attractions. They loved the art which, above all other arts, is designed to make home happy.

The American farmer is desirous to excel. He wants to have the best of everything that pertains to his calling. When he shall ascertain what is best for his present or prospective need, he will bend his energies to secure it, if practicable.

It is of the first necessity that he supply himself with the breed of cattle best suited to his needs—cattle that shall help to make farming a source of material prosperity, joyous health, and perpetual pleasure. Let the cattle, then, be worthy of our choice and have a large place in our esteem. What we think of our cattle, how we shall use them and make them serve us and our national prosperity, how we shall improve, transform, and perfect them for our purpose, how kindly we shall treat them and care for them, how they shall influence our life, our comfort, our health, our happiness, our usefulness, our sentiments, our philanthropy, will be told to the ages that come after us. Let the historian, the painter, and the poet have a share in this record, for they are to set forth in a new era of enlightenment a consummation of excellence that shall far exceed in beneficence all the earlier ages of the world's effete civilizations. The coming ages will not foster so much a pride of war and barbaric splendor. The patriot's boast in the new era shall not be like that of Henry V. of his soldiers, in battle, "whose blood is fet from fathers of

war proof," but a prouder exclamation will be that of all Americans—" We are the sons of fathers who made the name of their country glorious by the culture of the arts of peace!"

INFLUENCE OF CATTLE UPON LITERATURE.

All the lovers of choice cattle are glad to read about them. If the songs and sayings of those who have best expressed the sentiment of mankind in all that relates to cattle, the dairy, and the charms of country life should be gathered, they would make many delightful volumes.

Beginning with the oldest literature, we have in the writings of Moses the brief but sublime account of the creation of the world, with its plants, its cattle, and man, who is given the dominion over all cattle and all the earth's productions, and a lordly self-control.

There we have sketches of the patriarchs, of the religious sentiment of the world's best men; the history of sacrifice, confession of a moral stain that needed forgiveness and a divine cleansing, by and through a Substitute who was typified in the victim.

There we read of Abraham, who was " very rich in cattle, in silver and gold;" of the strife between his herdsmen and his nephew Lot, so amicably settled as ever to show himself the typical peace-maker among neighbors; his entertainment of the three angels with a calf tender and good, dressed with milk and butter.

We read of Isaac, his son, " who became very great, and had possession of flocks and herds;" of Jacob, the most famous cattle-breeder of the ancient world, who made his father-in-law rich, and then enriched himself out of his wages of spotted cattle.

What a perennial charm has the story of Joseph—his wonderful interpretation of the strange dream of Pharaoh, his purchase of all the cattle of the Egyptians for his brethren while he ruled in Egypt and furnished all the world with wheat! Then the deliverance, the laws of sacrifice, the promise to be led to " a goodly land that floweth with milk and honey." The songs of Moses, and his great poem, the Book of Job, contain many allusions to cattle.

The record of the capture of the Ark of Jehovah in the Book of Samuel, the miraculous disasters that befell its captors, and their device for returning the Ark to the Israelites, by a new cart drawn by two milch cows, that left their calves and went lowing all the way straight to the land of the Jews, is one of the most wonderful of the events in the history of that most wonderful of nations.

Asaph the Seer,* in his sacred psalms, sings of the majesty of Jehovah and his dominions:

* Bible Union Version, by T. J. Conant, D.D.

PSALM L.—THE CATTLE BELONG TO GOD.

"I am God, thy God
Not for thy sacrifices will I reprove thee;
And thy burnt-offerings are continually before me.
I will not take a bullock from thy house,
Nor he-goats from thy folds.
For mine is every beast of the forest,
The cattle on a thousand hills.
I know every bird of the mountains,
And the beasts of the field are before me.
If I were hungry I would not say it to thee;
For the world is mine, and the fulness thereof.
Will I eat the flesh of bulls,
And drink the blood of goats?
Sacrifice to God thanksgiving,
And pay to the Most High thy vows,
And call upon me in the day of trouble;
I will deliver thee, and thou shalt honor me."

PSALM LXXIII.—OUT OF EGYPT.

"And he removed as a flock his own people,
And guided them as a herd in the wilderness:
And he led them on safely, and they feared not,
But their enemies the sea overwhelmed."

The sacred psalms of David the King are full of poetic beauty and the melody of praise to Jehovah.

PSALM LXV.—GOD THE GIVER OF PROSPERITY.

"Thou hast visited the earth, and made it overflow [with plenty];
Thou greatly enrichest it.
The river of God is full of water.
Thou preparest their grain, for so dost thou prepare the earth;
Drenching its furrows, settling its ridges;
Thou makest it soft with showers,
Its springing up thou dost bless.
Thou hast crowned the year with thy goodness;
And thy footsteps drip with fatness;
The pastures of the wilderness they drip,
And the hills gird themselves with gladness.
The pastures are clothed with flocks,
And the valleys are robed with grain;
They shout together, yea, they sing."

PSALM CIV.—GOD'S BENEFICENCE IN CREATION.

"He sends out springs among the valleys;
They run among the mountains.
They give drink to every beast of the field;
The wild asses quench their thirst.
Above them dwell the fowls of heaven;
From among the branches they utter a voice.
He waters the mountains from his chambers;
The earth is sated with the fruit of thy working.
He causes grass to grow for the cattle,
And herbs for the service of man,
Bringing forth food out of the earth.

* * * * * *

They all wait for thee,
To give their food in its season.
Thou givest to them; they gather;
Thou openest thy hand, they are sated with good;
Thou hidest thy face, they are troubled;
Thou withdrawest their breath, they expire,
And return to their dust;
Thou sendest forth thy breath, they are created;
And thou renewest the face of the ground."

PSALM CVII.—GOD'S CARE FOR HIS PEOPLE.

"He turns the wilderness into a pool of water,
And a dry land into water-springs,
And there he makes the hungry dwell,
And they found a city for a habitation.
And they sow fields, and plant vineyards,
And produce fruits of the yearly increase.
And he blesses them, and they multiply greatly,
And their cattle he makes not few."

PSALM CXLIV.—A PRAYER FOR DIVINE BLESSING OF PEACE AND SECURITY.

"So that our sons may be as plants,
Full grown in their youth;
Our daughters as corner pillars,
Sculptured after the structure of a palace;
Our garners full, supplying of every kind;
Our flocks multiplying by thousands,
By tens of thousands, in our fields;
Our oxen laden;
No breaking in, nor going forth,
And no outcry in our streets.
Happy the people to whom it is thus;
Happy the people whose God is Jehovah!"

PSALM CXLVIII.—SONG OF PRAISE.

"Praise Jehovah from the earth;
Ye sea monsters and all deeps;
Fire and hail, snow and vapor,
Stormy wind fulfilling his word;
Ye mountains and all hills,
Fruit-trees and all cedars;
Beasts, and all cattle,
Creeping things and winged birds;
Kings of the earth, and all peoples,
Princes and all judges of the earth;
Young men, and also maidens,
Old men, with children;
Let them praise the name of Jehovah."

Solomon says:

"I had great possessions of great and small cattle above all that were in Jerusalem before me."

Among his three thousand proverbs we note:

"Be thou diligent to know the state of thy flocks, and look well to thy herds."
"A righteous man regardeth the life of his beast: but the tender mercies of the wicked are cruel."
"Where no oxen are, the crib is clean; but much increase is by the strength of the ox."

In the historic temple built by Solomon to the worship of Jehovah was a great brazen laver, or sea, resting on twelve gigantic brazen statues of oxen, in groups of three, looking north, south, east, and west. In the dedication of the temple twenty-two thousand oxen were offered among the sacrifices.

Isaiah, the most fervid and exalted in spirit of all the Hebrew poets, shows us the coming of the Giver of grace and truth, and a restoration of spiritual blessings, graphically typified by milk and honey, pleasant fields, and the feet of cattle. Habakkuk, too, in a sublime poem upon the majesty of God and his providence, intersperses like figures to portray the blessings of the day of prosperity; while the prophet Joel, by the desolate garners, by broken-down barns and withered corn, by groaning beasts and perplexed herds, by dried-up rivers and fire-devoured pastures, describes drouth and famine.

A PASTORAL ANTHOLOGY.

The Egyptians deified and worshipped the bull, and the cow was their symbol of the goddess of Love. Homer,* the greatest of Greek poets, makes frequent allusions to cattle, and many of the finest portions of the Iliad are thus illustrated.

Agamemnon, at the head of his armies on the plains before the city of Troy, is described as

* Translation of Alexander Pope.

JERSEY BELLE OF SCITUATE 7828.

AT 10 YEARS OLD.

Victor Type.

THE THOROUGHBRED MODEL.

ROMANO 11,806.

AT 20 MONTHS OLD.

Couch's Lily—Jersey Belle—Eurotas Type.

GREEN MOUNTAIN HERD.

MOULTON BROTHERS, WEST RANDOLPH, VERMONT.

ULTISSIMA 24,633.

AT 2 YEARS OLD.

Jersey Belle—Eurotas Type.

GREEN MOUNTAIN HERD.

MOULTON BROTHERS, WEST RANDOLPH, VERMONT.

> "majestically tall,
> Towers o'er his armies and outshines them all;
> Like some proud bull that round the pasture leads
> His subject herds, the monarch of the meads."

They sacrifice a steer to Jove in honor of the prowess of Ajax, and at the feast which follows, in which they eat the roasted flesh,

> "Before great Ajax placed the mighty chine."

Agamemnon, in his desire to appease the wrath of Achilles, makes a list of the rich presents and honors he will bestow, among them seven cities, and all the rich lands appertaining:

> "Along the verdant margin of the main,
> There heifers graze and laboring oxen toil."

When Patroclus is killed by Hector, the Spartan king Menelaus guards his body from capture:

> "Thus round her new-fallen young the heifer moves,
> Fruit of her throes and first-born of her loves,
> And anxious (helpless as he lies and bare)
> Turns and re-turns her with a mother's care."

The terrible fighting of Ajax Telemon, the Great, and Ajax Oileus, the Swift, side by side, in the fourth battle, is likened as follows:

> "So when two lordly bulls, with equal toil,
> Force the bright plowshare through the fallow soil,
> Joined to one yoke, the stubborn earth they tear,
> And trace large furrows with the shining share.
> O'er their huge limbs the foam descends in snow,
> And streams of sweat down their sour foreheads flow."

The shield of Achilles, as wrought by the god Vulcan, is of silver, brass, tin, and solid gold—

> "There shone the image of the master mind,
> There earth, there heaven, there ocean he designed."

The sun, the moon, the stars, two cities, two armies, golden gods, two spies, flocks, herds, battles, a field with plowmen, grain fields, vineyards with maids and youths.

> "Here herds of oxen march erect and bold,
> Rear high their heads, and seem to low in gold,
> And speed to meadows, on whose sounding shores
> A rapid torrent through the rushes roars;
> Four golden herdsmen as the guardians stand,
> And nine sour dogs complete the rustic band.
> Two lions rushing from the wood appeared
> And seized a bull, the master of the herd;

He roared ; in vain the dogs, the men, withstood ;
They tore his flesh, and drank the sable blood.
The dogs, oft cheered in vain, desert the prey,
Dread the grim terrors, and at distance bay.
Next this, the eye the art of Vulcan leads
Deep through fair forests and a length of meads,
And stalls, and folds, and scattered cots between,
And fleecy flocks that whiten all the scene.
A figured dance succeeds. . . .
The gazing multitudes admire around.
Thus the broad shield complete, the artist crowned
With his last hand, and poured the ocean round ;
In living silver seemed the waves to roll,
And beat the buckler's verge, and bound the whole."

An expression favorite with the great Homer, and showing his appreciation of the beauties of the bovine race of Greece, was,

"Goddess of the cow's fair eyes."

Hesiod, another Greek poet, is described by Elizabeth Barrett Browning as

"Hesiod old,
Who, somewhat blind and deaf and cold,
Cared most for gods and bulls."

In the Norse mythology, as recorded in the songs and legends which form the Icelandic Edda, "the giant Ymir and his shapeless progeny, Whirlwinds of the North and Terrors of the Deep, the enemies of the Sun and of Life, are succeeded by Aedhumla the Cow, who is formed of melting snow, and she, licking the white frost from the rocks, brings to light *Buri*, a Man! The sons of Man kill the giant Ymir, and from his flesh is formed the earth, from his bones the hills, from his skull the sky, from his blood the sea, and from his brains the clouds."

In the twelfth century Bernard of Clugny wrote a Latin hymn suggested by the verse of Moses, "a land flowing with milk and honey." In 1851 the hymn was translated into English by J. M. Neale. It is one of the most joyous and inspiring lyrics ever written—

"Jerusalem the golden,
With milk and honey blest,"

a view of that goodly land of everlasting peace and pleasure.

Among all the nations of antiquity, the Jews were the greatest lovers of cattle; but since their dispersion they seem to have lost that instinct, and now the Anglo-Saxon has become the leading race of cattle fanciers, and English literature is rich with its allusions to rural felicity. Shakespeare, in the third part of King Henry VI., Scene V., makes the king desire a farmer's life:

"O God! methinks it were a happy life
To be no better than a homely swain;
To sit upon a hill, as I do now,
To carve out dials quaintly, point by point,
Thereby to see the minutes how they run,
How many make the hour full complete:
How many hours bring about the day;
How many days will finish up the year;
How many years a mortal man may live.
When this is known, then to divide the times:
So many hours must I tend my flock;
So many hours must I take my rest;
So many hours must I contemplate;
So many hours must I sport myself;
So many days my ewes have been with young;
So many weeks ere the poor fools will yean;
So many years ere I shall shear the fleece:
So minutes, hours, days, weeks, months, and years,
Passed over to the end they were created,
Would bring white hairs into a quiet grave.
Ah! what a life were this! how sweet! how lovely!"

The prince of Christian poets, John Milton, invoking Mirth, invites her to show him all pleasant sights and give him all joyous sounds of rural life:

"While the plowman near at hand
Whistles o'er the furrowed land,
And the milkmaid singeth blithe,
And the mower whets his scythe,
And every shepherd tells his tale
Under the hawthorn in the dale."

Again Milton pictures rural delights to the unaccustomed senses—"Paradise Lost," Book IX.:

"As one who, long in populous city pent,
Where houses thick and sewers annoy the air,
Forth issuing on a summer's morn to breathe
Among the pleasant villages and farms
Adjoined, from each thing met conceives delight,
The smell of grain, or tedded grass, or kine,
Or dairy, each rural sight, each rural sound."

A plaintive allusion in "Paradise Lost" touches us with a strange pathos:

"Thus with the year
Seasons return, but not to me returns
Day, or the sweet approach of even or morn,

Or sight of vernal bloom or summer's rose,
Or flocks or herds, or human face divine;
But cloud instead, and ever-during dark
Surrounds me."

How beautiful is his description of the Angel Raphael and his visit to Paradise! Radiant with the splendor of

"Downy gold and colors dipped in heaven,"

he comes to the garden, and is entertained as a guest by Adam and Eve in their bower. Eve prepares a feast—

"fruit of all kinds,
Nect'rous draughts between from milky stream.
. . . . . . For drink the grape
She crushes, inoffensive must, and meaths
From many a berry; and from sweet kernels pressed
She tempers dulcet creams."

Robert Herrick in quaint verse, thanking God for his little house and the blessings of garden and field, says:

"The while the conduits of my kine
Run cream for wine."

Thomas Tickell pictures in fancy a country home, in which these lines occur:

"A rill shall warble 'cross the gloomy grove—
A little rill o'er pebbly beds conveyed
Gush down the steep, and glitter through the glade.
What cheering scents these bordering banks exhale!
How loud that heifer lows from yonder vale!
That thrush, how shrill!"

Alexander Pope, at twelve years, thus describes "The Quiet Life":

"Happy the man whose wish and care
A few paternal acres found,
Content to breathe his native air
In his own ground.
Whose herds with milk, whose fields with bread,
Whose flocks supply him with attire,
Whose trees in summer yield him shade,
In winter, fire."

James Thomson, in his "Castle of Indolence," gives many pleasing pictures. I select one:

"In health the wiser brutes true gladness find.
See how the younglings frisk along the meads,
As *May* comes on, and wakes the balmy wind;
Rampant with life, their joy all joy exceeds;
Yet what but highstrung health this dancing pleasaunce breeds?"

In his "Spring" he loves to

"wander o'er the dewy fields"

and

"Through the verdant maze of sweet-brier hedges
Taste the smell of dairy."

He was tender-hearted to all animals—

"To merit death ? You who have given us milk in luscious streams !"

He describes well the restlessness of a pastured bull, and the contest when two of them meet:

"And groaning deep the impetuous battle mix ;
While the fair heifer, balmy breathing near,
Stands kindling up their rage."

In his "Summer" (after a thunder storm):

"'Tis beauty all, and grateful song around,
Joined to the low of kine and numerous bleat
Of flocks thick nibbling through the clovered vale."

Alexander Hume thus pictures the "Summer Day":

"The burning beams down from his face
So fervently can beat,
That man and beast now seek a place
To save them from the heat.

"The herds beneath some leafy tree,
Amid the flowers they lie;
The stable ships upon the sea
Send up their sails to dry."

Thomas Gray, in his "Elegy," gives many a perfect verse:

"The lowing herd winds slowly o'er the lea,
* * * * *
And drowsy tinklings lull the distant folds.
* * * * *
How jocund did they drive their team afield !"

Oliver Goldsmith, in the "Deserted Village," thus describes sights and sounds at Auburn:

"Sweet was the sound when oft at evening's close
Up yonder hill the village murmur rose ;
There as I passed, with careless steps and slow,
The mingling notes came softened from below :
The swain responsive as the milkmaid sung ;
The sober herd that lowed to meet their young ;
The noisy geese that gabbled o'er the pool ;
The playful children just let loose from school ;
The watch-dog's voice that bayed the whispering wind,
And the loud laugh that spoke the vacant mind—
These all in sweet confusion sought the shade,
And filled each pause the nightingale had made."

William Cowper, the pensive Puritan poet, expressed a strong sympathy for man or beast suffering from cruelty. He was a lover of animals. How fair is the view of Ouse—the river he so loved—and the fields along its banks:

"Slow winding through a level plain
Of spacious meads, with cattle sprinkled o'er.
* * * * *
A breath of unadulterate air,
The glimpse of a green pasture, how they cheer
The citizen and brace his languid frame!
* * * * *
The heart is hard in nature, and unfit
For human fellowship, as being void
Of sympathy, and therefore dead alike
To love and friendship both, that is not pleased
With sight of animals enjoying life,
Nor feels their happiness augment his own.
* * * * *
The very kine that gambol at high noon,
The total herd receiving first from one,
That leads the dance, a summons to be gay,
Though wild their strange vagaries and uncouth
Their efforts, yet resolved with one consent
To give such act and utterance as they may
To ecstasy too big to be suppressed—
These and a thousand images of bliss
With which kind nature graces every scene,
Where cruel man defeats not her design,
Impart to the benevolent, who wish
All that are capable of pleasure, pleased,
A far superior happiness to theirs—
The comfort of a reasonable joy."

James Beattie, in "The Minstrel," gives us this pleasing line:

"Crowned with her pail, the tripping milkmaid sings."

Robert Burns, in his matchless picture of "The Cotter's Saturday Night," thus describes the simple meal, when Jennie's lover comes in to spend the evening:

"But now the supper crowns their simple board,
The halesome parritch, chief o' Scotia's food;
The soupe* their only hawkie† does afford,
That 'yont the hallan‡ snugly chows her cood:
The dame brings forth, in complimental mood,
To grace the lad, her weel-hained kebbuck,§ fell,‖
An' aft he's prest an' aft he ca's it guid,
The frugal wife, garrulous, will tell
How 'twas a towmond auld, sin' lint was i' the bell."

* Milk. † Cow. ‡ Partition wall. § Cheese. ‖ Sharp or biting.

The following gem is from "The Farmer's Boy," by Robert Bloomfield:

"A little farm his generous master tilled,
Who with peculiar grace his station filled,
By deeds of hospitality endeared.
Served from affection—for his worth revered;
A happy offspring blest his plenteous board,
His fields were fruitful and his barns well-stored,
And four-score ewes he fed, a sturdy team,
And lowing kine, that grazed beside the stream.
Unceasing industry he kept in view,
And never lacked a job for Giles to do.

*   *   *   *   *

The clattering dairymaid immersed in steam,
Singing and scrubbing midst her milk and cream,
Bawls out, 'Go fetch the cows!'

*   *   *   *   *

Straight to the meadows then he whistling goes;
With well-known halloo calls his lazy cows;
Down the rich pastures heedlessly they graze,
Or hear the summons with an idle gaze;
For well they know the cow-yard yields no more
Its tempting fragrance nor its wintry store.
Reluctance marks their steps, sedate and slow,
The right of conquest the only law they know;
The strong press on, the weak by turns succeed,
And one superior always takes the lead,
Is foremost wheresoe'er they stray,
Allowed precedence, undisputed sway;
With jealous pride her station is maintained,
For many a broil that post of honor gained.

*   *   *   *   *

Forth comes the maid, and like the morning smiles;
The mistress, too, and followed close by Giles.
A friendly tripod forms their humble seat,
With pails bright scoured and delicately sweet.
Where shadowing elms obstruct the morning ray
Begins the work, begins the simple lay;
The full-charged udder yields its willing stream,
While Mary sings some lover's amorous dream.
And crouching Giles, beneath a neighboring tree,
Tugs o'er his pail, and chants with equal glee;
Whose hat, with battered brim, of nap so bare,
From the cow's side purloins a coat of hair—
A mottled ensign of his harmless trade,
An unambitious, peaceable cockade.
As unambitious, too, that cheerful maid;
With joy she views her plenteous reeking store,
And bears a brimmer to the dairy-door,

Her cows dismissed, the luscious meads to roam
Till eve again recall them loaded home."

Here is "Country Life," from the pen of William Wordsworth—"March":

" The cock is crowing,
The stream is flowing,
The small birds twitter,
The lake doth glitter,
The green field sleeps in the sun
The oldest and youngest
Are at work with the strongest;
The cattle are grazing,
Their heads never raising,
There are forty feeding like one.

" Like an army defeated,
The snow hath retreated,
And now doth fare ill
On the top of the bare hill;
The plowboy is whooping—anon—anon!
There's joy on the mountain,
There's life in the fountain,
Small clouds are sailing,
Blue sky prevailing,
The rain is over and gone!"

A contrast to the sad experience of the homesick farmer in the city, by the same author, "The Farmer of Tilsbury Vale":

" To London—a sad emigration, I ween—
With his gray hairs, he went from the brook and the green,
And there with small wealth but his legs and his hands,
As lonely he stood as a crow on the sands.
* * * * * *
In the throng of the town like a stranger is he,
Like one whose own country's far over the sea
And nature, while through the city he hies,
Full ten times a day takes his heart by surprise.
* * * * * *
'Mid coaches and chariots, a wagon of straw,
Like a magnet, the heart of old Adam will draw.
With a thousand soft pictures his memory will teem,
And his hearing is touched with the sound of a dream.
* * * * * *
Up the Hay-market hill he oft whistles his way,
Thrusts his hands in a wagon and smells at the hay;
He thinks of the fields he so often hath mown,
And is as happy as if the rich freight were his own.
* * * * * *

But chiefly to Smithfield he loves to repair ;
If you pass by at morning you'll meet with him there.
The breath of the cows you may see him inhale,
And his heart all the while is in Tilsbury Vale."

James Hogg gives us this pretty song :

" Come, all ye jolly shepherds
That whistle through the glen ;
I'll tell ye o' a secret
That courtiers dinna ken :
What is the greatest bliss
That tongue of man can name ?
'Tis to woo a bonnie lassie
When the kye come hame,
When the kye come hame,
When the kye come hame,
'Tween the gloamin' an' the mirk,
When the kye come hame.

* * * * *

" When the blackbird bigs his nest
For the mate he lo'es to see,
And on the tapmost bough,
Oh, a happy bird is he !
There he pours his melting ditty,
And love is a' the theme ;
And he'll woo his bonnie lassie
When the kye come hame.

" When the blewart bears a pearl,
And the daisy turns a pea,
And the bonnie lucken gowan
Has fauldit up his ee,
Then the lavrock, frae the blue lift,
Draps down and thinks nae shame
To woo his bonnie lassie
When the kye come hame.

* * * * *

" When the little wee bit heart
Rises high in the breast,
And the little wee bit starn
Rises red in the East,
Oh, there's a joy sae dear,
That the heart can hardly frame,
Wi' a bonnie, bonnie lassie,
When the kye come hame."

Felicia Hemans, in " The Switzer's Wife," has this melodious couplet :

" And when the herd's returning bells are sweet
In the Swiss valleys, and the lakes grow still."

The following beautiful stanza is taken from John Keats's "Ode on a Grecian Urn":

" Who are these coming to the sacrifice ?
To what green altar, O mysterious priest,
Lead'st thou that heifer lowing at the skies,
And all her silken flanks in garlands drest ?
What little town by river or seashore,
Or mountain-built with peaceful citadel,
Is emptied of its folk this pious morn ?
And, little town, thy streets forevermore
Will silent be, and not a soul to tell
Why thou art desolate, can e'er return."

Samuel Ferguson, in "The Pretty Girl of Loch Dan," has this stanza :

" She brought us in a beechen bowl
Sweet milk that smacked of mountain thyme,
Oat cake, and such a yellow roll
Of butter—it gilds all my rhyme !"

From Alfred Tennyson's "In Memoriam" the following is culled :

" And brushing ankle-deep in flowers,
We heard behind the woodbine veil
The milk that bubbled in the pail,
And buzzings of the honeyed hours."

From "The Gardener's Daughter" :

" The fields between
Are dewy fresh, browsed by deep uddered kine,
And all about the large lime feathers, low,
The lime a summer home of murmurous wings.
* * * * * *
All the land in flowery squares,
Beneath a broad and equal blowing wind,
Smelt of the coming summer. . . .
The steer forgot to graze,
And, where the hedgerow cuts the pathway, stood
Leaning his horns into the neighbor field,
And lowing to his fellows. From the woods
Came voices of the well-contented doves.
The lark could scarce get out his notes for joy,
But shook his song together as he neared
His happy home, the ground. To left and right
The cuckoo told his name to all the hills ;
The mellow ouzel whistled in the elm ;
The redcap whistled ; and the nightingale
Sang loud, as though he were the bird of day."

From "The Palace of Art":

"Or sweet Europa's mantle blew unclasped
From off her shoulders backward borne:
From one hand drooped a crocus; one hand grasped
The mild bull's golden horn."

The pathetic ballad, by Charles Kingsley, "O Mary, go and call the Cattle Home!" is very popular:

"O Mary, go and call the cattle home,
And call the cattle home,
And call the cattle home,
Across the banks o' Dee!
The western wind was wild and dank wi' foam,
And all alone went she.

"The creeping tide came up along the sand,
And o'er and o'er the sand,
And round and round the sand,
As far as eye could see;
The blinding mist came down and hid the land,
And never home came she.

"Oh, is it weed, or fish, or floating hair—
A tress o' golden hair,
O' drowned maiden's hair—
Above the nets at sea?
Was never salmon yet that shone so fair,
Among the stakes on Dee.

"They towed her in across the rolling foam—
The cruel, crawling foam,
The cruel, hungry foam—
To her grave beside the sea;
But still the boatmen hear her call the cattle home
Across the sands o' Dee."

The following is a part of "The Milkmaid's Song," by Sidney Dobell:

"Wheugh! wheugh! He's whistling through—
He's whistling 'The Farmer's Daughter.'
Give down, give down,
My crumpled brown!
He shall not take the road to town,
For I'll meet him beyond the water.
Give down, give down,
My crumpled brown!
And send me to my Harry!
The folks o' towns
May have silken gowns,
But I can milk and marry.
* * * * *

I'm too late for my Harry !
And oh, if he goes a-soldiering,
The cows they may low, the bells they may ring,
But I'll neither milk nor marry.
Fill pail,
Neither milk nor marry.
* * * * *
They may talk of glory over the sea,
But Harry's alive, and Harry's for me,
My love, my lad, my Harry !
Come spring, come winter, come sun, come snow,
What cares Dolly whether or no,
While I can milk and marry ?
Right or wrong, and wrong or right,
Quarrel who quarrel, and fight who fight,
But I'll bring my pail home every night
To love, and home, and Harry !"

No English poet has better depicted the emotions of the human heart or the vicissitudes of rural life than Jean Ingelow. How sweetly is the "old story" told in these few verses selected from "The Maiden with the Milking-Pail":

"What change has made the pastures sweet,
And reached the daisies at my feet,
And cloud that wears a golden hem ?
This lovely world, the hills, the sward—
They all look fresh, as if our Lord
But yesterday had finished them.
* * * * *
"I see the pool more clear by half
Than pools where other waters laugh
Up at the breasts of coot and rail.
There, as she passed it on her way,
I saw reflected, yesterday,
A maiden with a milking-pail.

"There, neither slowly nor in haste—
One hand upon her slender waist,
The other lifted to her pail—
She, rosy in the morning light,
Among the water-daisies white,
Like some fair sloop appeared to sail.

"Against her ankles as she trod
The lucky buttercups did nod ;
I leaned upon the gate to see.
The sweet thing looked, but did not speak ;
A dimple came in either cheek,
And all my heart was gone from me.
* * * * * *

"With happy youth and work content,
So sweet and stately on she went,
Right careless of the untold tale;
Each step she took I loved her more,
And followed to her dairy door
The maiden with the milking-pail.

* * * * *

"And when the west began to glow
I went—I could not choose but go—
To that same dairy on the hill;
And while sweet Mary moved about
Within, I came to her without,
And leaned upon the window-sill.

"The garden border where I stood
Was sweet with pinks and southern wood.
I spoke—her answer seemed to fail.
I smelt the pinks—I could not see!
The dusk came down and sheltered me,
And in the dusk she heard my tale.

"O life, how dear thou hast become!
She laughed at dawn, and I was dumb.
But evening counsels best prevail.
Fair shine the blue that o'er her spreads,
Green be the pastures where she treads,
The maiden with the milking-pail!"

In "The High Tide on the Coast of Lincolnshire" the poet makes an English matron who lived five miles from old Boston tell the tragic story, in the quaint speech of the time (1571), a little more than a half century before people of the same neighborhood came to settle Massachusetts and Connecticut. The poet Spenser was then a youth of eighteen and Shakespeare was a boy of seven years.

"The old mayor climbed the belfry tower,
The ringers ran by two, by three.
'Pull if ye never pulled before—
Good ringers, pull your best!' quoth he.
'Play uppe, play uppe, O Boston bells!
Ply all your changes, all your swells—
Play uppe the *Brides of Enderby*.'

"Men say it was a stolen tyde—
The Lord that sent it, He knows all;
But in myne ears doth still abide
The message that the bells let fall.
And there was nought of strange beside
The flight of mews and peewits pied
By millions crouched on the old sea wall.

"I sat and spun within the doore;
 My thread brake off, I raised myne eyes;
The level sun, like ruddy ore,
 Lay sinking in the barren skies:
And dark against day's golden death
She moved where Lindis wandereth,
My sonne's fair wife, Elizabeth.

"'Cusha! Cusha! Cusha!' calling
Ere the early dews were falling,
 Farre away I heard her song,
 'Cusha! Cusha!' all along;
Where the reedy Lindis floweth,
  Floweth, floweth,
From the meads where melick groweth
 Faintly came her milking song.

"'Cusha! Cusha! Cusha!' calling,
'For the dews will soon be falling;
Leave your meadow grasses mellow,
  Mellow, mellow,
Quit your cowslips, cowslips yellow.
Come uppe, Whitefoot, come uppe, Lightfoot,
Quit the stalks of parsley hollow,
  Hollow, hollow;
Come uppe, Jetty, rise and follow,
 From the clovers lift your head;
Come uppe, Whitefoot, come uppe, Lightfoot,
Come uppe, Jetty, rise and follow,
 Jetty, to the milking shed.'

"If it be long—aye, long ago,
 When I begin to think howe long,
Again I hear the Lindis flow,
 Swift as an arrowe, sharpe and strong;
And all the aire it seemeth me
Bin full of floating bells (sayth shee),
That ring the tune of Enderby.

"All fresh the level pasture lay,
 And not a shadow mote be seene,
Save where full fyve good miles away
The steeple towered from out the greene;
And lo! the great bell, farre and wide,
Was heard in all the country side,
That Saturday at eventide.

"The swannerds where their sedges are
 Moved on in sunset's golden breath;
The shepherde lads I heard afarre,
 And my sonne's wife, Elizabeth;

Till floating o'er the grassy sea
Came down that kyndly message free,
The 'Brides of Mavis Enderby.'

"Then some looked uppe into the sky,
And all along where Lindis flows,
To where the goodly vessels lie,
And where the lordly steeple shows.
They sayde, 'And why should this thing be,
What danger lowers by land or sea?
They ring the tune of Enderby!

"'For evil news from Mablethorpe,
Of pyrate galleys warping down;
For shippes ashore beyond the scorpe,
They have not spared to wake the towne:
But while the west bin red to see,
And storms be none, and pyrates flee,
Why ring 'The Brides of Enderby'?

"I looked without, and lo! my sonne
Came riding downe with might and main;
He raised a shout as he drew on,
Till all the welkin rang again—
'Elizabeth! Elizabeth!'
(A sweeter woman ne'er drew breath
Than my sonne's wife, Elizabeth.)

"'The olde sea wall (he cried) is downe,
The rising tide comes on apace,
And boats adrift in yonder towne
Go sailing up the market-place!'
He shook as one that looks on death:
'God save you, mother!' straight he saith;
'Where is my wife, Elizabeth?'

"'Good sonne, where Lindis winds away
With her two bairns I marked her long;
And ere yon bells beganne to play
Afar I heard her milking song.'
He looked across the grassy sea,
To right, to left, 'Ho, Enderby!'
They rang 'The Brides of Enderby!'

"With that he cried and beat his breast,
For lo! along the river's bed
A mighty eygre reared his crest,
And uppe the Lindis raging sped.
It swept with thunderous noises loud,
Shaped like a curling, snow-white cloud,
Or like a demon in a shroud.

"And rearing Lindis backward pressed,
  Shook all her trembling banks amaine ;
Then madly at the eygre's breast
  Flung uppe her weltering walls again.
Then banks came down with ruin and rout ;
Then beaten foam flew round about ;
Then all the mighty floods were out.

"So farre, so fast the eygre drave,
  The heart had hardly time to beat,
Before a shallow, seething wave
  Sobbed in the grasses at oure feet ;
The feet had hardly time to flee
Before it brake against the knee,
And all the world was in the sea.

"Upon the roofe we sate that night,
  The noise of bells went sweeping by ;
I marked the lofty beacon light
  Stream from the church tower, red and high—
A lurid mark and dread to see ;
And awsome bells they were to me,
That in the dark rang 'Enderby.'

"They rang the sailor lads to guide
  From roofe to roofe who fearless rowed ;
And I—my sonne was at my side,
  And yet the ruddy beacon glowed ;
And yet he moaned beneath his breath,
'O come in life, or come in death,
O lost ! my love, Elizabeth.'

"And didst thou visit him no more ?
  Thou didst, thou didst, my daughter deare ;
The waters laid thee at his doore,
  Ere yet the early dawn was clear.
Thy pretty bairns in fast embrace,
The lifted sun shone on thy face,
Downe drifted to thy dwelling-place.

"That flow strewed wrecks about the grass,
  That ebbe swept out the flocks to sea ;
A fatal ebbe and flow, alas !
  To manye more than myne and me.
But each will mourn his own (she sayth),
And sweeter woman ne'er drew breath
Than my sonne's wife, Elizabeth.

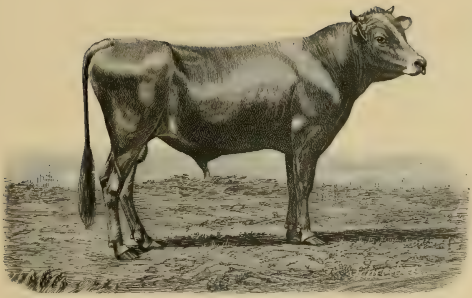
"I shall never hear her more
By the reedy Lindis shore,

EUROTAS 2454.

Rioter-Alphea Type.

DARLINGTON HERD.

A. B. DARLING, RAMSEY'S, NEW JERSEY.



EUROTAS' BLACK PRINCE 14,384.

AT 17 MONTHS OLD.

Eurotas Type.

FAIRVIEW HERD.

G. AND H. B. CROMWELL, NEW DORP, P. O. STATEN ISLAND, N. Y.

PRIDE OF MOUNTAINSIDE 7118.

AT 3 YEARS OLD.

Eurotas—Belle Dame Type.

FAIRVIEW HERD.

G. AND H. B. CROMWELL, NEW DORP, P. O. STATEN ISLAND, N. Y.

'Cusha! Cusha! Cusha!' calling,
Ere the early dews be falling;
I shall never hear her song,
'Cusha! Cusha!' all along
Where the sunny Lindis floweth,
Goeth, floweth;
From the meads where melick groweth,
When the water windeth down,
Onward floweth to the town.

"I shall never see her more
Where the reeds and rushes quiver,
Shiver, quiver,
Stand beside the sobbing river,
Sobbing, throbbing, in its falling,
To the sandy, lonesome shore;
I shall never hear her calling,
'Leave your meadow grasses mellow,
Mellow, mellow,
Quit your cowslips, cowslips yellow;
Come uppe, Whitefoot, come uppe, Lightfoot;
Quit your pipes of parsley hollow,
Hollow, hollow.
Come uppe, Lightfoot, rise and follow;
Lightfoot, Whitefoot,
From your clovers lift the head.
Come uppe, Jetty, follow, follow,
Jetty, to the milking shed.'"

American poets, too, are appreciative of the beauties of rural life. William Cullen Bryant, in his "Summer Ramble," lulls the soul with that

"deep quiet that awhile
Lingers the lovely landscape o'er."

"The quiet August noon has come,
A slumberous silence fills the sky;
The fields are still, the woods are dumb,
In glassy sleep the waters lie.
* * * * *
'And mark yon soft white clouds that rest
Above our vale, a moveless throng;
The cattle on the mountain's breast
Enjoy the grateful shadow long.
* * * * *
"The village trees their summits rear
Still as its spire, and yonder flock,
At rest in those calm fields, appear
As chiselled from the lifeless rock."

Henry Wadsworth Longfellow, in his "Rain in Summer," thus expresses "Rest in the Furrow":

"In the furrowed land
The toilsome and patient oxen stand;
Lifting the yoke-encumbered head,
With their dilated nostrils spread,
They silently inhale
The clover-scented gale
And the vapors that arise
From the well-watered and smoking soil.
For this rest in the furrow after toil
Their large and lustrous eyes
Seem to thank the Lord,
More than man's spoken word."

In his "Evangeline" he thus describes an "Evening in Acadia":

"Now recommenced the reign of rest and affection and stillness;
Day, with its burden and heat, had departed, and twilight descending,
Brought back the evening star to the sky, and the herds to the homestead.
Pawing the ground they came, and resting their necks on each other,
And with their nostrils distended inhaling the freshness of evening.
Foremost, bearing the bell, Evangeline's beautiful heifer,
Proud of her snow-white hide and the ribbon that waved from her collar,
Quietly paced and slow, as if conscious of human affection.

"Patiently stood the cows meanwhile, and yielded their udders
Unto the milkmaid's hand; while loud and in regular cadence
Into the sounding pails the foaming streamlets descended.
Lowing of cattle and peals of laughter were heard in the farmyard,
Echoed back by the barns."

The following is a description of John Alden's bull, from the "Courtship of Miles Standish":

"Close to the house was the stall, where, safe and secure from annoyance,
Raghorn, the snow-white bull, that had fallen to Alden's allotment
In the division of cattle, might ruminate in the night-time
Over the pastures he cropped, made fragrant with sweet pennyroyal."

After the wedding:

"Then from a stall near at hand, amid exclamations of wonder,
Alden, the thoughtful, the careful, so happy, so proud of Priscilla,
Brought out his snow-white bull, obeying the hand of its master,
Led by a cord that was tied to an iron ring in its nostrils,
Covered with crimson cloth, and a cushion placed for a saddle.

* * * * * * * *

"Onward the bridal procession now moved to their new habitation,
Happy husband and wife, and friends conversing together.

Pleasantly murmured the brook, as they crossed the ford in the forest,
Pleased with the image that passed like a dream of love through its bosom.
Tremulous, floating in air, o'er the depth of the azure abyss,
Down through the golden leaves, the sun was pouring his splendors,
Gleaming on purple grapes, that from branches above them suspended,
Mingled their odorous breath with the balm of the pine and the fir tree,
Wild and sweet as the clusters that grew in the valley of Eschol.
Like a picture it seemed of the primitive, pastoral ages,
Fresh with the youth of the world, and recalling Rebecca and Isaac.
So through the Plymouth woods passed onward the bridal procession."

John Greenleaf Whittier embodies a sentiment of "Peace" as follows:

"The grain grew green on battle plains,
O'er swarded war-mounds grazed the cow;
The slave stood forging from his chains
The spade and plow;"

and "Prosperity" in these lines from "The Preacher":

"The land lies open and warm in the sun,
Anvils clamor and millwheels run;
Flocks on the hillsides, herds on the plain,
The wilderness gladdened with fruit and grain!"

From "Mountain Pictures":

"So twilight deepened round us. Still and black
The great woods climbed the mountain at our back;
And on the skirts where yet the lingering day
On the shorn greenness of the clearing lay,
The brown old farmhouse like a bird's nest hung.
With home-life sounds the desert air was stirred:
The bleat of sheep along the hill we heard,
The bucket plashing in the cool, sweet well,
The pasture bars that clattered as they fell;
Dogs barked, fowls fluttered, cattle lowed; the gate
Of the barnyard creaked beneath the merry weight
Of sunbrown children, listening while they swung,
The welcome sound of supper call to hear;
And down the shadowy lane, in tinklings clear,
The pastoral curfew of the cowbell rung."

"The Barefoot Boy" sighs as fond memory calls up the past:

"O for festal dainties spread
Like my bowl of milk and bread—
Pewter spoon and bowl of wood
On the doorstone gray and rude!"

How sweetly he sings of "The Merrimac River"!

"Sing soft, sing low, our lowland river,
Under thy banks of laurel bloom;
Softly and sweet, as the hour beseemeth,
Sing us the songs of peace and home.
*   *   *   *   *   *
"Bring us the airs of hills and forests,
The sweet aroma of birch and pine;
Give us a waft of the north wind laden
With sweetbrier odors and breath of kine!
*   *   *   *   *   *
"And well may we own thy hint and token
Of fairer valleys and streams than these,
Where the rivers of God are full of water,
And full of sap are his healing trees."

From "The Voice of the Grass," by Sarah Roberts, these happy lines are taken:

"Here I come creeping, creeping everywhere;
In the noisy city street
My pleasant face you'll meet,
Cheering the sick at heart,
Toiling his busy part—
Silently creeping, creeping everywhere.

"Here I come creeping, creeping everywhere,
More welcome than the flowers
In summer's pleasant hours.
The gentle cow is glad,
And the merry bird not sad,
To see me creeping, creeping everywhere.

"Here I come creeping, creeping everywhere;
My humble song of praise
Most joyfully I raise
To Him at whose command
I beautify the land—
Creeping, silently creeping everywhere."

What child in the land does not love this pretty "Milking Song," by Celia Thaxter?

"Little dun cow to the apple tree tied,
Chewing the cud of reflection,
I that am milking you sit by your side,
Lost in a sad retrospection.

"Far o'er the fields the tall daisies blush warm,
For rosy the sunset is dying;
Across the still valley, o'er meadow and farm,
The flush of its beauty is lying.

"White foams the milk in the pail at my feet,
Clearly the robins are calling ;
Soft blows the evening wind after the heat;
Cool the long shadows are falling.

"Little dun cow, 'tis so tranquil and sweet !
Are you light-hearted, I wonder ?
What do you think about—something to eat ?
On clover and grass do you ponder ?"

And the "Farm-Yard Song," by J. T. Trowbridge:

"Over the hill the farm-boy goes,
His shadow lengthens along the land,
A giant staff in a giant hand ;
In the poplar tree, above the spring,
The katydid begins to sing,
The early dews are falling.
Into the stone-heap darts the mink,
The swallows skim the river's brink,
And home to the woodland fly the crows,
When over the hill the farm-boy goes,
Cheerily calling,
'Co', boss ! co', boss ! co' ! co' ! co' !'
Farther, farther over the hill,
Faintly calling, calling still,
'Co', boss ! co', boss ! co' ! co' ! co' !'

"Into the yard the farmer goes,
With grateful heart, at the close of day :
Harness and chain are hung away ;
In the wagon-shed stand yoke and plow,
The straw's in the stack, the hay in the mow,
The cooling dews are falling.
The friendly sheep his welcome bleat,
The pigs come grunting to his feet,
The whinnying mare her master knows,
When into the yard the farmer goes,
His cattle calling—
'Co', boss ! co', boss ! co' ! co' ! co' !'
While still the cow-boy, far away,
Goes seeking those who have gone astray—
'Co', boss ! co', boss ! co' ! co' ! co' !'

"Now to her task the milkmaid goes,
The cattle come crowding through the gate,
Lowing, pushing, little and great ;
About the trough, by the farmyard pump,
The frolicsome yearlings frisk and jump,
While the pleasant dews are falling.

The new milch heifer is quick and shy,
But the old cow waits with tranquil eye :
And the white stream into the bright pail flows,
When to her task the milkmaid goes,
Soothingly calling,
'So, boss ! so, boss ! so ! so ! so !'
The cheerful milkmaid takes her stool,
And sits and milks in the twilight cool,
Saying, 'So ! so, boss ! so ! so !'

"To supper at last the farmer goes,
The apples are pared, the paper read,
The stories are told, then all to bed.
Without, the cricket's ceaseless song
Makes shrill the silence all night long ;
The heavy dews are falling.
The housewife's hand has turned the lock ;
Drowsily ticks the kitchen clock ;
The household sinks to deep repose,
But still in sleep the farm-boy goes,
Singing, calling,
'Co', boss ! co', boss' ! co' ! co' ! co !'
And oft the milkmaid in her dreams,
Drums in the pail with the flashing streams,
Murmuring, 'So, boss ! so !'"

This collection would hardly be complete without introducing the following "Reminiscence" from the *Harvard Advocate* :

"We stood at the bars as the sun went down
Behind the hills, on a summer day ;
Her eyes were tender and big and brown,
Her breath as sweet as the new-mown hay.

"Far from the west the faint sunshine
Glanced sparkling off her golden hair ;
Those calm deep eyes were turned toward mine,
And a look of contentment rested there.

"I see her bathed in the sunlight flood,
I see her standing peacefully now ;
Peacefully standing and chewing her cud,
As I rubbed her ears—that Jersey cow !"

PART FIRST.

HISTORY OF JERSEY CATTLE — PRINCIPLES OF BREEDING.

JERSEY.

THE island of Jersey, the native home of the breed of Jersey cattle, is the chief in size of the group called Channel Islands, lying near the coast of France in the English Channel.

Jersey lies west of the province of Normandy about sixteen miles and about the same distance south-west from the island of Guernsey, and is eleven miles in length from east to west and seven and a half miles in breadth.

The surface of the land has a general slope south-eastwardly, being high and precipitous on the north, with table-lands in the central portion intersected by brooks and runnels which flow to the south and east.

The coast is picturesque in savage ruggedness, being high and precipitous on the north, and indented by numerous bays on the east, south, and west.

The climate is mild and equable, and the air moist, and rains frequent. The mean temperature is 50.8°, August being the warmest and February the coolest month, while from mid October to mid December the weather resembles our Indian summer, and is called St. Martin's Summer.

The soil is very rich, deep, and porous from centuries of tillage. Means of fertility are afforded by the large number of cattle, green herbage, and large quantities of sea-weeds collected under strict regulations of the local government.

The island contains 39,680 acres, 25,000 of which are cultivated. The population is nearly 57,000, about 15,000 being English denizens and 2000 Parisians and others, who resort thither for health or the pleasant enjoyment of a very delightful climate and picturesque scenery. Jersey is divided into twelve parishes, and the lands are held in small farms of five to twenty acres.

The productions are the famous Jersey cattle, enormous crops of potatoes, wheat, parsnips, mangolds, carrots, turnips, and a variety of cabbage which has a long, woody stem surmounted by a tuft of broad leaves; these last grow from six to twelve feet high, and are used for cow fodder. There are numerous orchards and graperies, which produce choice fruit.

The flora and fruits of semi-tropical regions flourish equally well as those of the temperate zone, and include oranges, lemons, and such trees as azalea, oleander, and fuchsia, the last being used for hedges and decoration of buildings.

The grasses are short and luscious, and green all winter.

The Romans occupied the island in the third and fourth centuries, and were so charmed with its natural beauties and climate that they called it Cæsarea, or Cæsar's Isle. Subsequently a mixed population of Gauls, Goths, Danes, and Saxons occupied Jersey until the Norman conquest of England. Jersey was English under William the Conqueror; English under Henry I.; Norman again under Stephen; English again under Henry II., since which time it has been steadfastly loyal to the English crown.

During the last century the people of Jersey have become very prosperous, and now derive a good income by the exportation of their favorite cattle, which are sent to all parts of the world, but chiefly to America, where they are best appreciated and most successfully bred.

ORIGIN OF THE RACE OF JERSEY CATTLE.

"The cattle of this island are superior to the French cattle" (Philip Falle, A.D. 1734). This is the first historical statement I have found regarding the quality of the Jersey race of cattle. The history of their origin is more mythical and legendary than that of the people of Jersey. The cattle are commonly supposed to be a composite race derived from the cattle of Brittany and Normandy, but neither the Brittany nor Cotentin breed equals the Jersey of to-day in productive capacity or beauty of form or color. The Montafu breed of cattle in the mountainous district near Lake Constance is said to resemble much the modern Jersey, as also the cattle of Lombardy; and in the Saguenay region of Canada there are specimens closely resembling the Jersey, the descendants of cattle brought by French emigrants from Brittany.

We know little of the races of cattle of Southern Europe at this day, and much less of their history of one or two thousand years ago. The remote origin of the Jersey is still more problematical. It is well to note the very striking resemblance between the modern Jersey and the Zebu or sacred cattle of India. The beautifully blended silver gray and slate shadings, the delicacy of frame, the fine bone, the yellow skin, the black muzzle, black tongue, and black switch, the almost identical facial expression, the shape and setting of the eye, the small ear, the slender horn, are wonderfully alike in Jersey and Zebu.

Is it too much to conjecture that the patriarch Jacob, in his experiments with the herds and flocks of Laban, whereby he produced and fixed fantastic and grotesque markings of white, also combined the blood of the Zebu bull with that of his historical race of spotted cattle?

Most writers on the origin of the Jersey attribute the yellow coats, buff points, and white patches to the Normandy or Cotentin race, which is supposed to be the source of the present breed of Guernsey Island, while the solid colors and black points are attributed to the Brittany race, although some assume that there has been an admixture of Norway cattle with the Jersey.

Mr. James P. Swain says: "I consider the cows on the island of Jersey Norman, mixed with another distinct breed, the main characteristics of each being still plainly visible, though growing less so yearly. The original, or highest type, I call the wild Jersey; the other type I consider Norman or Guernsey.

"The wild Jersey has a black nose, black tongue, and mealy muzzle; the other, a buff nose. The wild Jersey's horns are black, pointed, firm, with single curve, forming nearly a semicircle, deeply fluted inside when taken off. The other has weak horns, shelly, yellow, waxy near the head, inclined downward, with double curve, compacted, smooth inside when taken off. The color of the female wild Jersey is chocolate, or mink color, no white spots, and the males nearly black. The others are yellowish, brown and white, star in forehead. The wild Jersey's skin is olive brown; the other, skin very yellow, even to the end of the tail. In the wild Jersey the tail terminates in a small tuft of long hairs, the skin near the end scaly with the accumulation of coloring matter. The other, skin on tail very yellow, even to the end, where there is an accumulation of coloring matter, which the Guernsey men call 'a lump of butter;' the long hair on the tail starts higher up."

Professor Low and Charles W. Elliott support the statement that these "darker colored or wild Jerseys clearly resemble the Norwegian cattle of to-day," and "that these old sea-rovers have taken their cattle to these islands."

But it is the island of Jersey, with its bland climate and centuries of gentle care and management by the women of Jersey, that has produced what is now known as the best butter cow in the world.

One hundred and fifty years ago the Rev. Philip Falle wrote of the Jerseys as above quoted, and it may have required centuries of selection to enable a faithful historian to make this statement.

The Jersey cow is tethered to the ground, being changed five or six times a day to a new station. When she calves she is regaled with toast and with cider, the nectar of the island, to which powdered ginger is added.

Thomas Quayle, who in 1812 wrote a work on the "Agriculture of the Channel Islands," is quoted as saying that "on hearing praises bestowed on any particular cows, they generally, but not always, were found to have a black tinge."

He also states that "the general purity of the breed is guarded by the rooted opinions of the inhabitants rather than by the sanction of law; but hitherto no persevering, systematical experimenter has attempted, by a careful selection of individuals and attention to their crosses, to improve this breed. When a cow is famed

as a good milker, her male progeny is preserved; but this is for a short period, and it is not known whether any other measure whatever has been persevered in to keep up the breed at its present standard."

IMPROVEMENT OF THE JERSEY.

The Royal Jersey Agricultural Society originated in the year 1833 from a desire on the part of some intelligent and progressive men to improve the island cattle and advance their system of agriculture.

Previous to that time laws had been passed by the local legislature prohibiting importation of any cattle from France, the first bearing date of July 16th, 1763. This continued in force until 1789, when the celebrated "Act of the States of Jersey" was passed on the 8th of August of that year. The first article of the Act of 1789 provided that any person introducing any cattle from France should be subject to a fine of £200 sterling, besides the confiscation of the cattle and the boat, and obliged every sailor to be an informer against his master within twenty-four hours, under a penalty of £50 sterling, such fines to go one third to the crown and two thirds to the poor of the parish; and if the master was insolvent, he was to be imprisoned six months. Article II. required all beef cattle imported to be landed at St. Helier or St. Aubin, under the same penalties for violation.

Article III. required cattle from the adjacent islands to be landed at the same ports, under the same penalties for violation.

Article IV. confiscated every French animal landed contrary to law, and required its immediate slaughter and distribution to the poor of the parish where seized.

Articles V., VI., VII., and VIII. regulated the exportation of Jersey cattle.

The law of March 18th, 1826, increased the fine to £1000 for importing French animals, the fine imposed being repeated for each and every animal. All accomplices were subjected to the same fine. All cattle found on ship or boat within two leagues of the island were confiscated, as well as the boat, and the same fines imposed as for landing cattle.

Three ports were set apart for the introduction of beef cattle.

Still another act was passed in 1864, in harmony with the treaties between France and England. Article III. permitted the importation of French cattle for consumption or in transit. Article IV. prohibited the breeding of foreign cattle on the island. Article VIII. required all French cattle to be branded with the letter F, and to be slaughtered at the port of St. Helier, or re-embarked at the same port. The fine was reduced to £10 sterling for each head of cattle, one third to be paid to the informer, or six months' imprisonment of the principal, if unable to pay the fine. Several attempts have been made to cross the Jersey with the Shorthorn and

Ayrshire breeds, but they were abandoned, and the progeny slaughtered because it was inferior to the Jersey.

Guernsey cattle are not prohibited, and a very few may be found upon the island. Crosses between the breeds produce buff nose and eyes, and the offspring retains a coarseness, at once detected and rejected by the judges at examination for Herd Book or for prizes at fairs. The natural pride that a Jerseyman has in his cow, and his desire to mate her with a prize bull, is an incentive to keep the breed pure.

On the 18th of January, 1834, over fifty years ago, the society drew up their first scale of points. The Jersey cow as she then existed and was described by Colonel Le Couteur and by the judges that officiated at the show was quite a different animal from the Jersey cow of to-day. It was impossible then to find a cow on the island that came near to the ideal by the standard of that time. Two of the best cows were selected from which to make up a scale of points, one of them being considered perfect in forequarters and barrel, the other in her hindquarters. The scale consisted of seven articles and twenty-five counts for a bull and the same number of articles and twenty-seven counts for a cow.

The Jersey cow was described by the judges in the year 1834 as follows:

"1. That the cattle were very much out of condition.

"2. Too slightly formed behind and cat-hammed.

"3. Gait unsightly.

"4. The udder ill-formed.

"5. The tail coarse and thick.

"6. The hoofs large.

"7. The head coarse and ill-shaped.

"8. Many were without that golden or yellow tinge within the ears which denotes a property to produce yellow and rich butter.

"9. Some cows and heifers had short bull necks.

"10. Some had too much flesh or dewlap under the throat.

"11. Some were too heavy in the shoulders.

"The first show was held March 31st, 1834. The prizes amounted to £24. Colonel Le Couteur won the general prize of £3 with a red and white yearling bull. . . . The cultivation of parsnips was advocated. It was resolved to encourage fine bulls with points up to perfection by giving a premium of £10 for perfect bulls, and allowing the owners 2*s*. a head for each cow that shall have been with calf by such bulls."

"In 1835 the show furnished not only a larger supply, but the animals were of a much finer order as to breed and condition."

"Her Majesty became a patroness in 1837.

"Two shows were held—one in March for bulls and the other in May for cows

and heifers. This division of the shows has continued up to the present day. The system of giving points for pedigree commenced in 1838." The scale of points was modified, increasing the number of counts to twenty-eight for bulls and heifers, and thirty for cows. Two new rules required that the owner of a prize bull, by withholding his services from the public, should forfeit his prize-money, and the second that prize heifers must remain upon the island until they had dropped their first calf. The annual reports indicate that improvement in the cattle exhibited was very rapid. After seven years, attention to breeding had almost caused the ancient characteristic defect, the drooping hindquarter, to disappear; also several minor defects; and it only remained to give squareness to the hindquarter and roundness to the barrel to render the Jersey a most beautiful animal."

At the annual dinner Colonel Le Couteur said in a speech: "Let me say to those who are lukewarm to this society to look back ten years. The land foul with weeds, crops inferior, liquid manure wasted, the market ill supplied. What had been effected?

"In cattle, beauty of form and flesh had been added to milking and creaming qualities. More cattle had been decorated this year than on any previous occasion, and the breed had so greatly improved that many of the animals rejected for having less than nineteen points would have been prize cattle when the society was formed, so well were their merits understood. The price of cattle had fully doubled."

The scale of points was revised again in the years 1849, 1851, and 1858.

During these years the reputation of the Jersey had greatly increased in England and America, and a fraudulent trade had sprung up by the French dealers exporting the cattle of Brittany to England as Jerseys, or Alderneys, as they were then misnamed. In 1850 and subsequent years several American gentlemen of wealth and influence began to make importations of Jerseys to the United States; among these were Daniel Buck, Jr., John A. Taintor, and John T. Norton, of Connecticut, and Thomas Motley, of Massachusetts; importations have been almost constant, except during the civil war, since that time. It is believed that the average quality of those early importations has not been excelled in later days, as the Americans tempted the Jerseymen to forfeit their prizes by offering them very liberal sums for decorated bulls and cows. But the American importations gave a new stimulus to Jersey breeders on the island, and the several parishes began to form farmers' clubs, which resulted in a great increase of cattle shows and a larger exhibition for the parent society. The report for 1858 was retrospective: "Thirty years ago the cattle were ill-fed, ill-shaped beasts that knew not the taste of mangolds, carrots, or swedes, scarcely that of hay; whose stabling was wretched, and whose winter food consisted chiefly of straw and a few watery turnips.

"Now they were well fed, improved in quality and symmetry, and well housed.

"The watery turnip, by careful husbandry, has become as rich as cheese. New buildings dotted the island, and general prosperity dawned on the farmer."

The Island Herd Book was started in the year 1866. "The Herd Book is entirely due to the forethought and untiring efforts of Mr. Charles P. Le Cornu. . . . He foresaw, many years before the Herd Book was started, the necessity of some further classification of the animals in a show where upward of two hundred were exhibited, so he determined to work out a unique system of his own. His principle was to sift, as it were, these large gatherings into three classes, by highly commending the best for their quality, symmetry, and constitution, and their butyraceous or milk-flowing properties; commending the second best and rejecting the remainder, or third class; and by examining the approved offspring he hoped in time to root out the bad animals, so that with six or seven registered crosses animals might be bred more to a certainty."

At the May show, 1874, Mr. Charles Nicolle offered a cup for the cow with the best escutcheon according to the Guenon system. The prize is still continued by voluntary contributions. Guenon prizes are also given for bulls.

The keeping of the modern Jersey upon the island from calfhood is as follows:* "When the cow has dropped her calf, there is sprinkled upon it a handful of powdered salt, and the cow licks it off. This bit of salt causes the cow to drink. While she is licking her calf she is milked, and drinks the first milking. The calf being dry, it is placed upon a bed of straw in a small stall. After some hours the cow is again milked, and her milk, mixed with tepid water, is given to the calf. The little animal is fed in this manner three times a day for the first three days. Afterward, for the next three days, the evening milk is kept till morning, the cream taken off, and the remainder, mixed with water quite warm, is served to the calf. The sixth day the keeping of cream for butter-making begins; the milk is skimmed every twenty-four hours, which permits it to become thick and acid. This milk is given to the calf twice every day, not forgetting to mix warm water therewith, and not hesitating to add at the end cooked flour, or even a slice of broken bread taken upon a plate held in the hand, in order to assist the calf in swallowing it. From time to time salt is added to the beverage, and a little hay. At the end of three months, if the weather is fine, the calf is able to go out; it then becomes stronger, and when the milk of the dam begins to diminish, the calf is given twice a day a warm beverage composed of cornmeal and bran.

"When the animal, always submitted to this regimen, attains the age of ten to thirteen months, and it is exceptionally fine, there is no hesitation in continuing this alimentation until it is sold; if the animal is of second quality, the beverages are stopped, in order to habituate it, little by little, to the food of the fields. A heifer

* Jersey Cattle, by Henri Johanet, translated by W. E. Simonds.

can be taken to the bull at nine months, but good heifers ought to wait to fifteen months. The cattle are as much as possible left in the open air from the month of May till the first of September. They are tethered in the open field, where the animal takes delight, making a void around itself. When in the stable it receives every day four or five pounds of dry food, and from twenty-five to thirty pounds of roots, the feedings taking place seven or eight times a day. The principal forage plants are, before all, Swedish turnips and parsnips; then come carrots, radishes, field turnips, beets, etc. During a milking period of about three hundred days a good Jersey cow gives daily, at the maximum, twenty-seven litres; at the minimum, eighteen litres of milk. The result in butter is from eight to ten pounds a week; it may be three to five kilogrammes of butter. The Jersey pound is four hundred and eighty-eight grains."

Insufficient attention is paid to the butter quality of island animals. A bull may take all the first prizes—that for best bull on the island, the prize for best Herd Book bull, and the silver cup for best escutcheon, and his dam and grand dam might be very poor butter-makers; so a cow may take the silver cup for best cow on the island, the first Herd Book prize, and the Guenon prize for best escutcheon without having a record for butter-making herself, and not belonging to a line of noted butter-makers; she may have all the fine and fancy points, and produce a large quantity of milk, and still be a very poor butter cow.

It is in America that the breed has begun to be rightly appreciated, and that only recently, because of the practice of testing cows to ascertain their butter-making capacity.

THE AMERICAN JERSEY CATTLE CLUB.

In the year 1868 Colonel George E. Waring, Jr., Samuel J. Sharpless, Charles M. Beach, Thomas J. Hand, and a number of Jersey cattle-breeders held a meeting in Philadelphia, which resulted in the organization of the American Jersey Cattle Club, with about forty members. The number has since increased to more than three hundred, and it is believed to represent more wealth and intelligence than any similar body of men in the world.

The object of the club from its incipiency was to foster absolute purity of breeding, and all the interests accruing from such breeding.

The adoption of a constitution and stringent by-laws and the formation of a "Herd Register" prepared the way for the success which has followed. Up to that time, by a sort of "Irish bull," the Jersey was called an "Alderney," and the Guernsey cattle also went by the same appellation, although the two breeds are very unlike, and neither of them was associated in any way whatever with the island of Alderney, except that Alderney has a mongrel mixture of the two breeds which are not imported to this country. No animal can be registered as imported from Jersey which is not identified by certificates from the agent of the club resident in the

island, and no American animal can be registered which is not proven to be the offspring of animals already registered.

The Herd Register is now the standard of pedigree in the United States and Canada, and contains a record of all transfers of cattle, with the names of owners, thus giving a complete history of every animal recorded.

CHARACTERISTICS OF THE MODERN JERSEY.

The Jersey bull or cow of the year 1885 differs widely in form and color from the Jersey bull or Jersey cow of fifty years ago. By the skill of numerous breeders on the Island, in England, and America, as well as by the influences of climate and feed, and also by various hidden causes, very marked changes have been effected in perpetuating features and peculiarities that were once very rare, or by fixing the characteristics of sports and phenomenal animals so as to form distinct families and diverse types.

The Jersey of to-day is the most beautiful of all the bovine races, matchless for symmetry, variety of beautiful colors and shadings, and for that delicacy of frame and fineness of quality which makes the race attractive to the eye and taste of all lovers of bovine beauty. At the same time, the Jersey cow excels all other races in the amount and quality of butter. Since the practice of testing cows for butter has become popular, which is only in recent years, upward of one thousand Jersey cows have produced fourteen pounds of butter in a test of seven days, while the reports show that ninety of these have tested twenty pounds, or upward, in a week; and twelve cows are classed in the list that have produced twenty-five pounds, or upward, in seven days; one cow has made, by official test, forty-six pounds, twelve and a half ounces; another, thirty-nine pounds, twelve ounces; and another, thirty-six pounds, twelve and a quarter ounces of butter in seven days.

The Jerseys have been bred for centuries for their choice quality of milk and butter, and during the last half century, in their native island, in England, and America, much attention has been given to perfection of form and beautiful tints of color and fancy markings.

The breed is classed as medium to small in size; but in America the tendency is to select those of larger development, and to cultivate an increase of the size. The Jersey is of that spare habit of flesh consistent with the best dairy qualities, and the food she eats so assimilated and the secretory powers so highly developed as to fill the udder with all the fats and oils, instead of excreting them or accumulating them about the vital organs or upon the body, as in beeves.

The Jersey is fine in bone, of rare symmetry, and has just enough muscular development for healthful activity and full digestive force. Some individuals indicate a marvellous capacity for changing a large quantity of grain and forage into the best of dairy productions.

JERSEY COLORS.

The young Jersey is colored like the fawn, or young deer. This ground color is, later on, so modified by the second growth of hair as to produce, in different animals, an endless variety of soft, pleasing tints. In describing Jersey colors they are classed as fawns, grays, or browns. The fawns are described with the tint and shading as, for the

METALLIC TINTS:

golden fawn, silver, copper, bronze, steel, slate, brick-dust, granite, and pearl fawns;

COLOR TINTS:

yellow, fawn, red, blue, gray, brown, bay, buff, cinerous, drab, dun, smoky, tan, dusky and blackish fawns, and ivory black;

ANIMAL TINTS:

buckskin, beaver, bison, dove, otter, oriole, fox, mink, moose, mouse, seal, salmon, seashell, sable, and squirrel fawns;

VEGETABLE TINTS:

orange, lemon, banana, apple, strawberry, russet, maize, butternut, mulberry, cane, mahogany, coffee-seed, cinnamon, and chocolate fawns;

DAIRY TINTS:

cream fawn, milky fawn, cheese and butter fawns;

GRAYS:

squirrel, silver, slate, orange, court, French, blue, steel, iron, cinerous or ash, russet, and lavender grays.

One animal may have several of these tints beautifully blended and shaded, as the bull St. Helier 45, bright salmon fawn and silver gray, or the cow Mary Anne of St. Lambert 9770, a light smoky bay fawn. Some bulls have dark markings resembling the spots of a leopard. Many Jerseys have irregular patches of white, the white being soft and sometimes margined with a half-inch border of deep indigo. Jersey Belle of Scituate 7828 was a dark strawberry fawn, with white saddle on withers, and white on hips, sides, belly, and legs. A rich golden waxy dandruff shone under the white and a nankeen color on the udder and escutcheon. Some Jerseys of dark color have a rich cadmium orange tint within the ears, and very conspicuous also on the dewlap and the escutcheon. Many of the best cows have the broad white saddle upon the withers. A Jersey does not depend upon the color of the coat for any degree of the richness of milk or creamy qualities. The great amount

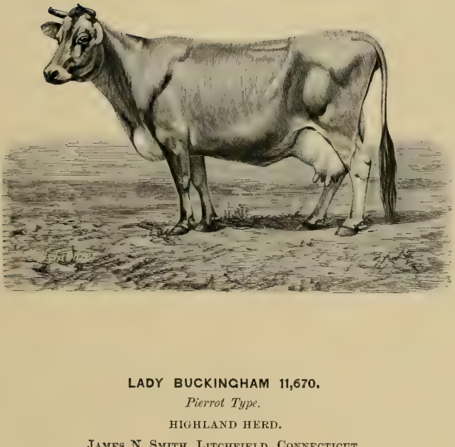
BELMEDA 6229.

AT 9 YEARS OLD.

Superb Type.

FAIRVIEW HERD.

G. AND H. B. CROMWELL, NEW DORP, P. O. STATEN ISLAND, N. Y.



LADY BUCKINGHAM 11,670.

Pierrot Type.

HIGHLAND HERD.

JAMES N. SMITH, LITCHFIELD, CONNECTICUT.

of butter fat secreted in the milk is a special trait, highly developed in the whole Jersey race and phenomenally shown in certain individuals and families. Some animals have the special ability to give a rich golden tint to their butter. This desirable trait is generally thought to be positively indicated by a rich golden-orange lining of the ears.

There need be no fashion in color, but in the essential dairy qualities the highest perfection should be sought. One can breed for color and fancy points if he so desires. Wonderful results can be achieved by selection and inbreeding. An ancient breeder was very successful in fixing spots, ringstreak, and specks not only upon bulls and cows, but upon sheep, goats, camels, and asses; and some of the modern breeders of Jerseys have proved that they can breed out the spots without any detriment to the race.

THE SCALE OF POINTS.

From the first organized effort to improve the Jersey a "scale of points" has been deemed a necessity. The scale is supposed to embody in a schedule the descriptions of the ideal Jersey bull and ideal cow.

The first scale of points adopted on the Island of Jersey, January 18th, 1834, is as follows:

SCALE OF POINTS FOR BULLS.

Articles.	Points.
1. Purity of breed on male and female sides reputed for having produced rich and yellow butter	4
2. Head fine and tapering; cheek small; muzzle fine, and encircled with white; nostrils high and open; horns polished, crumpled, not too thick at the base, tapering, and tipped with black; ears small, of an orange color within; eye full and lively	8
3. Neck fine and highly placed on shoulders; chest broad; barrel hooped and deep, well ribbed home to hips	3
4. Back straight from the withers to the setting on of tail, at right angles to the tail; tail fine, hanging two inches below the hock	3
5. Hide thin and movable, mellow, well covered with soft and fine hair of a good color	3
6. Forearm large and powerful; legs short and straight, swelling and full above the knee and fine below it	2
7. Hind-quarters from the huckle to the point of the rump long and well filled up; the legs not to cross in walking	2
Perfection	25

No prize to be awarded to a bull having less than twenty points.

SCALE OF POINTS FOR COWS.

Articles.	Points.
1. Breed on male and female sides reputed for producing rich and yellow butter	4
2. Head small, fine, and tapering; eye full and lively; muzzle fine and encircled with white; horns polished and a little crumpled, tipped with black; ears small, of an orange color within	8
3. Back straight from the withers to the setting on of the tail; chest deep and nearly on a line with the belly	4
4. Hide thin, movable, but not too loose, well covered with fine soft hair of good color	2
5. Barrel hooped and deep, well ribbed home, having but little space between the ribs and hips; tail fine, hanging two inches below the hock	3
6. Fore-legs straight and fine; thighs full and long, not too close together when viewed from behind; hind-legs short, and bones rather fine; hoofs small; hind-legs not to cross in walking	2
7. Udder full, well up behind; teats large and squarely placed, being wide apart; milk veins large and swelling	4
Perfection for cows	27

Two points shall be deducted for heifers.

A heifer will be considered perfect at twenty-five points.

No prize shall be awarded to cows and heifers having less than twenty-four points.

The scale of points had several changes at various times. In 1858 bulls stood at thirty-one and cows at thirty-three articles and thirty-three points, each article counting but one in the scale.

In April, 1875, a new scale was adopted.

RATIO SCALE OF POINTS FOR BULLS.

Articles.	Points.
1. Registered pedigree	5
2. Head fine and tapering, forehead broad	5
3. Cheek small	2
4. Throat clean	4
5. Muzzle dark, encircled by light color, with nostrils high and open	4
6. Horns small, not thick at base, crumpled, yellow, tipped with black	5
7. Ears small and thin, and of a deep orange color within	5
8. Eyes full and lively	4
9. Neck arched, powerful, but not coarse and heavy	5
10. Withers fine, shoulders flat and sloping, chest broad and deep	4
11. Barrel hooped, broad, deep, and well ribbed up	5

Articles.		Points.
12.	Back straight from the withers to the setting on of the tail	5
13.	Back broad across the loins	3
14.	Hips wide apart and fine in the bone	3
15.	Rump long, broad, and level	3
16.	Tail fine, reaching the hocks and hanging at right angles with the back	3
17.	Hide thin and mellow, covered with fine soft hair	4
18.	Hide of a yellow color	4
19.	Legs short, straight and fine, with small hoofs	4
20.	Arms full and swelling above the knees	3
21.	Hind-quarters from the hock to the point of rump long, wide apart, and well filled up	3
22.	Hind-legs squarely placed when viewed from behind, and not to cross or sweep in walking	3
23.	Nipples to be squarely placed and wide apart	5
24.	Growth	4
25.	General appearance	5
	Perfection	100

No prize to be awarded to bulls having less than eighty points. Bulls having obtained seventy-five points shall be allowed to be branded.

RATIO SCALE OF POINTS FOR COWS AND HEIFERS.

Articles.		Points.
1.	Registered pedigree	5
2.	Head small, fine, and tapering	3
3.	Cheek small, throat clean	4
4.	Muzzle dark and encircled by a light color, with nostrils high and open	4
5.	Horns small, not thick at base, crumpled, yellow, tipped with black	5
6.	Ears small and thin, and of a deep orange color within	5
7.	Eye full and placid	3
8.	Neck straight, fine, and lightly placed on the shoulders	3
9.	Withers fine, shoulders flat and sloping, chest broad and deep	4
10.	Barrel hooped, broad and deep, being well ribbed up	5
11.	Back straight from withers to the setting on of the tail	5
12.	Back broad across the loins	3
13.	Hips wide apart, and fine in the bone ; rump long, broad and level	5
14.	Tail fine, reaching the hocks, and hanging at right angles with the back	3
15.	Hide thin and mellow, covered with fine soft hair	4
16.	Hide of a yellow color	4
17.	Legs short, straight, and fine, with small hoofs	3

Articles.	Points.
18. Arms full and swelling above the knees	3
19. Hind-quarters from the hock to point of rump long, wide apart, and well filled up	3
20. Hind-legs squarely placed when viewed from behind, and not to cross or sweep in walking	3
21. Udder large, not fleshy, running well forward, in line with the belly and well up behind	5
22. Teats moderately large, yellow, of equal size, wide apart, and squarely placed	5
23. Milk veins about the udder and abdomen prominent	4
24. Growth	4
25. General appearance	5
Perfection	100

No prize shall be awarded to cows having less than eighty points.

No prize shall be awarded to heifers having less than seventy-one points.

Cows having obtained seventy-five points and heifers sixty-five shall be allowed to be branded.

The articles Nos. 21 and 23 shall be deducted from the number required for perfection in heifers, as their udders and milk veins cannot be fully developed.

SCALE OF POINTS FOR COWS, ADOPTED BY THE AMERICAN JERSEY CATTLE CLUB, APRIL 21, 1875.

Points.	Counts.
1. Head small, lean, and rather long	2
2. Face dished, broad between the eyes and narrow between the horns	1
3. Muzzle dark, and encircled by light color	1
4. Eyes full and placid	1
5. Horns small, crumpled, and amber-colored	3
6. Ears small and thin	1
7. Neck straight, thin, rather long, with clean throat, and not heavy at the shoulders	4
8. Shoulders sloping and lean; withers thin; breast neither deficient nor beefy	3
9. Back level to the setting on of tail, and broad across the loin	4
10. Barrel hooped, broad, and deep at the flank	8
11. Hips wide apart, and fine in the bone; rump long and broad	4
12. Thighs long, thin, and wide apart, with legs standing square, and not to cross in walking	4
13. Legs short, small below the knee, with small hoofs	3

POINTS.	COUNTS.
14. Tail fine, reaching the hocks, with good switch	3
15. Hide thin and mellow, with fine soft hair	4
16. Color of hide where the hair is white, on udder and inside of ears, yellow	5
17. Fore-udder full in form and running well forward	8
18. Hind-udder full in form, and well up behind	8
19. Udder free from long hair and not fleshy	5
20. Teats rather large, wide apart, and squarely placed	6
21. Milk veins prominent	5
22. Escutcheon high and broad, and full on thighs	8
23. Disposition quiet and good-natured	3
24. General appearance rather bony than fleshy	6
Perfection	100

In judging heifers, omit Nos. 17, 18, and 21.

The same scale of points shall be used in judging bulls, omitting Nos. 17, 18, 19, and 21, and making moderate allowance for masculinity.

The American Jersey Cattle Club adopted, February 11th, 1885, a new scale of points, as below:

FOR COWS.

POINTS.	COUNTS.
1. Head small and lean, face dished, broad between the eyes and narrow between the horns	2
2. Eyes full and placid; horns small, crumpled, and amber-colored	1
3. Neck thin, rather long, with clean throat, and not heavy at the shoulders	8
4. Back level to the setting on of tail	1
5. Broad across the loin	6
6. Barrel long, hooped, broad and deep at the flank	10
7. Hips wide apart; rump long and broad	10
8. Legs short	2
9. Tail fine, reaching the hocks with good switch	1
10. Color and mellowness of hide; inside of ears yellow	5
11. Fore-udder full in form and not fleshy	13
12. Hind-udder full in form and well up behind	11
13. Teats rather large, wide apart, and squarely placed	10
14. Milk veins prominent	5
15. Disposition quiet	5
16. General appearance and apparent constitution	10
Perfection	100

In judging heifers, omit 11, 12, and 14.

FOR BULLS.

The same scale, omitting Nos. 11, 12, and 14, and making due allowance for masculinity; but when bulls are exhibited with their progeny, in a separate class, add thirty counts for progeny.

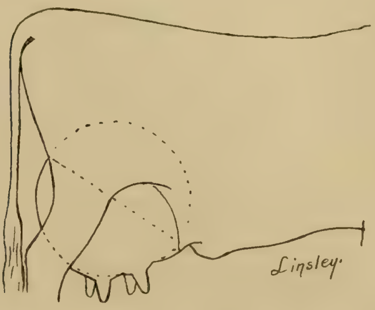
SCALE OF POINTS FOR COWS IN MILK.*

POINTS.	COUNTS.
1. Weight of milk in twenty-four hours, one count for each pound of yield, 32 lbs.	32.00
2. Total solids by chemical analysis, one count for each percentum, 13.76	13.76
3. Butter fat, three per cent. being standard, add ten per cent. for every one per cent. above, or deduct ten per cent. for every one per cent. below the standard, 5.25	22.50
4. Time since calving, add one count for every ten days—one hundred and twenty-three days	12.30
Total	80.56

The above figures are those of the first prize cow at the Edinburgh Show.

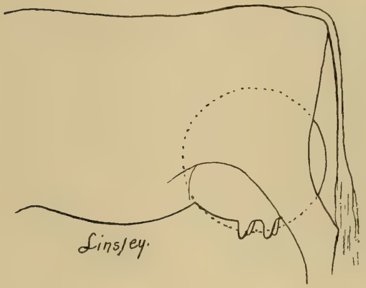
This scale, with an additional point for a butter test on specified rations, would insure a fair test of merit at exhibitions in contests between all breeds of dairy cows.

DIAGRAMS ILLUSTRATING SOME OF THE MORE IMPORTANT POINTS.

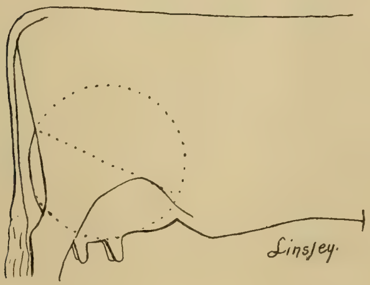


NO. 1.—OUTLINE OF UDDER, BARREL, RUMP, AND THIGH OF JERSEY BELLE OF SCITUATE 7828.

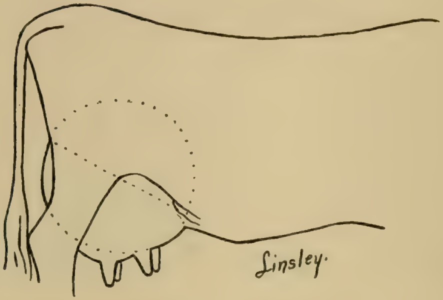
* Scale devised by James McQueen, judge of Edinburgh Dairy Show, 1885.



No. 2.—Outline of Udder, Barrel, Rump, and Thigh of Princess 2d 8046.



No. 3.—Outline of Udder, Barrel, Rump, and Thigh of Mary Anne of St. Lambert 9770.



No. 4.—Outline of Udder, Barrel, Rump, and Thigh of Dandelion 2521.

No. 5.—Outline of Udder, Barrel, Rump, and Thigh of Lady Vertumnus 13,217.

THE ESCUTCHEON.

The escutcheon consists of that portion of the surface of an animal which is covered by a reversed growth of hair. It usually includes the udder, the inner surface of the thighs, a portion of the space above the twist, and a part of the surface of the abdomen.

Francis Guenon, the discoverer of this feature in the animal kingdom, by which he rendered his name immortal, was a native of Libourne, France. He was the son of a nurseryman, and had become expert in the art of propagating and grafting fruits. While yet a boy, upon hearing his grandfather say he thought cows might be judged as easily as fruit trees, if we only knew their points, he was ever on the alert to make the saying good, and thereby made the discovery, which, after years of observation, he ingeniously systematized and demonstrated to his own complete satisfaction. This system he afterward disclosed by proving his skill as an expert upon herds of cattle before agricultural societies, and received high recognition, many honors, and medals, and was appointed lecturer on his system in the agricultural schools of France, and also received a pension from the government during his lifetime.

THE GUENON SYSTEM.

The limits of the escutcheon as described by Guenon are from the centre of the lower surface of the udder upward, the inner surface of the thighs and a portion of the perineal region, from the udder to the setting on of the tail. The escutcheon has several regular types, which Guenon classified according to their shape. There are ten of these regular forms, which he described under ten different names, or classes, besides which there are irregular and mixed forms. The ten classes of escutcheon are: 1, flandrine; 2, left flandrine; 3, selvedge; 4, curveline; 5, bicorn; 6, double selvedge; 7, demijohn; 8, square; 9, limousine; 10, carresine. The first class he named because he saw many of them in the province of Flanders, and the cows were great milkers. The second class was left-hand and one-sided; the third class had a narrow strip, like the border on a piece of cloth; the fourth had a curved arch; the fifth had a double top, or two horns; the sixth was an oddity, with two narrow strips; the seventh resembled a wine-jug; the eighth, a carpenter's square; the ninth was common in the province of Limoges, and steeple-shaped; the tenth was level at the top, or horizontal.

In each of these ten classes he made six orders, or sixty distinct forms; also a defective escutcheon, which he called *batard*, or counterfeit. In the first class there are twelve of these counterfeit escutcheons, and in each of the other classes six counterfeits, thus making sixty-six counterfeit escutcheons.

SYNOPSIS OF THE SYSTEM OF GUENON.

We will first make a brief analysis of the system according to Guenon. In describing his system he used the term "escutcheon," from the shield-like form of the upward growth covering the back part of the udder and thighs; and "Epis" or "feather" for certain peculiar marks on escutcheons by which he designated the various orders. He describes seven different "feathers," five on the surface of the escutcheon and two outside of the escutcheon.

By referring to the diagrams the terms "escutcheon" and "feather" will be fully explained and illustrated.

Stand behind the cow which produces the largest quantity of milk, and you will notice a peculiarity of hair growth which is upward on the udder and above in a broad band to the tail, and outward upon the thighs. Brush the hair in the direction of its growth with your hand, and you will find it softer than satin to the touch. You will notice another peculiar growth, a small oval mark of white hair over each hind teat, where the direction of the hair is downward. This "escutcheon" and this oval, or "oval feather," are shown in Fig. I., p. 59. Fig. II. shows the location of the "buttock feather;" Fig. III., the "babine feather;" Fig. IV., the "vulvous feather;" Fig. V., the "batard feather;" Fig. VI., the "thigh feather;" Fig. VII., the "dart feather."

Fig. I.

THE OVAL FEATHER.

The oval feather is often found on the best escutcheons. If these feathers are small, regular in form, and composed of very fine hair, they are usually an excellent sign; but if large, of irregular shape, and of long coarse hair, they are a mark of inferior quality. This feather should be about two inches long by one inch wide.

Fig. II.

THE BUTTOCK FEATHER.

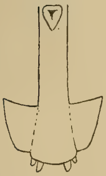
The buttock feather is on the right and left of the vulva, outside of the escutcheon. Its hair is ascending, and it is usually two to three inches in length by half an inch in width. If smaller than this and of fine hair they are not specially indicative of inferiority; but if larger, and the hair is coarse, they always indicate an earlier cessation of the milk-flow, according to size and coarseness.

Fig. III.

THE BABINE FEATHER.

The babine feather is a narrow streak of down-growing hair within the escutcheon, starting from the side of the vulva—usually upon the left side, but may be upon either or both sides. It is usually two inches long by a quarter inch in width, but may be six inches in length.

I.



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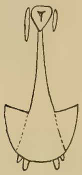

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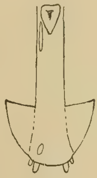

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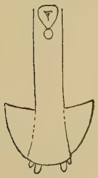

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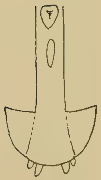


VI.

VII.

VIII.

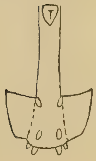


Fig. IV.

THE VULVOUS FEATHER.

The vulvous feather consists of down-growing hair enclosing the lower part of the vulva in a V-shape or forked like a W. It is one inch deep and wide to six inches in depth.

Fig. V.

THE BATARD FEATHER.

The batard feather, or counterfeit oval, is of down-growing white hair in the centre of the escutcheon midway between the udder and vulva, and, according to size and degree of coarseness, it indicates a falling off in milk during pregnancy. It may be six inches by two inches in size, or much smaller.

Fig. VI.

THE THIGH FEATHER.

The thigh feather is an encroachment of ingrowing hair upon the escutcheon of the thigh, and is in the form of a crescent or a triangle, and indicates inferiority, according to size of feather and coarseness of hair.

Fig. VII.

THE DART FEATHER.

The dart feather, also called *epijonctif*, is the result of crossing or compounding a selvedge escutcheon with any of the short escutcheons. It resembles a dart with the point downward, and consists of fine up-growing hair. It is situated beneath the vulva, is an inch wide at the top, and is considered an improvement to the short escutcheons.

The oval feather and the dart feather are good feathers or decorations; the buttock feather, babine feather, vulvous feather, batard feather, and thigh feather are bad feathers, or blots upon the escutcheon.

CLASSES AND ORDERS.

The first class, or flandrine escutcheon, extends from the centre of the four teats upward to the setting on of the tail.

The first order has an oval feather over each hind teat, is full out on the thighs, and has a clean smooth upgrowth fully three inches wide to the root of the tail.

Cow a perpetual milker.

The second order has one oval feather and a babine feather about two inches long on the left or right of vulva. Goes dry two months.

The third order has a vulvous feather one inch to two inches deep, and goes dry three months.

The fourth order has a vulvous feather about five inches long and crescent thigh feather on right thigh. Goes dry four months.

The fifth order has a vulvous feather six inches deep and a triangular thigh feather on right thigh. Goes dry five months.

The sixth order has a vulvous feather eight inches deep and a very small thigh escutcheon invaded by triangular thigh feathers. Goes dry six months.

The size of the escutcheon dwindles in all its parts in each descending order.

THE SECOND CLASS, OR LEFT FLANDRINE ESCUTCHEON.

The first order resembles that of the flandrine, except that it runs up on the left flank, and the right thigh wing is apparently wider than the left wing. There are two oval feathers, and the cow seldom or never goes dry.

The second order has a babine feather on the left, and goes dry two months.

The third order has a babine feather six inches long and crescent thigh feather right thigh. Goes dry three months.

The fourth order has a longer babine feather, a half-moon thigh feather right side, and a triangular thigh feather left side. Goes dry four months.

The fifth order has a coarse flaring escutcheon, a large triangle thigh feather right side. Goes dry five months.

The sixth order has a very small coarse escutcheon, and goes dry six months.

The batard, or counterfeit, has the same marks in all the orders, with the exception of enormous coarse buttock feathers five inches long by three wide. The milk is watery, and falis off rapidly when pregnant.

THIRD CLASS, OR SELVEDGE ESCUTCHEON.

The first order runs fully one inch wide up to the vulva, and is of full width (eighteen inches) on the thighs, with the two oval feathers on the udder. Never goes dry unless forced to do so.

The second order has a left oval feather and a left buttock feather. Goes dry two months.

The third order has two buttock feathers, the left about three inches long. Goes dry three months.

The fourth order has two buttock feathers, the left four inches long, and goes dry four months.

The fifth order has a broken list, the buttock feathers five inches long, and goes dry five months.

The sixth order has a ragged escutcheon; the buttock feathers are six inches long, and she is dry six months.

The batard orders are similarly marked to the six free orders, but have enormous coarse buttock feathers five inches long by three wide, and produce thin milk and are soon dry.

THE FOURTH CLASS, OR CURVELINE ESCUTCHEON.

The first order has the two oval feathers, the escutcheon is eighteen inches wide on the thighs, and ascends in a round arch to within eight inches of the vulva. Never dry unless forced or injured.

The second order has a left oval feather and one small left buttock feather. Dry two months.

The third order has two buttock feathers, the left three inches long, and goes dry three months. There is sometimes a triangular thigh feather right side.

The fourth order has buttock feathers six inches long, right triangle and left crescent thigh feathers, and goes dry four months.

The fifth order has buttock feathers seven inches long and thigh feathers eight by four inches. Goes dry five months.

The sixth order has a very diminutive escutcheon, and goes dry six months.

The batard curveline cows have very large and coarse buttock feathers, and give thin milk, going dry soon.

THE FIFTH CLASS, OR BICORN ESCUTCHEON.

The first order has two oval feathers, a thigh escutcheon eighteen inches wide, and the upper part of the escutcheon terminating in two points, the left higher than the right and within four to eight inches of the vulva. There may be two very small buttock feathers of equal size. Dry one month.

The second order has one left oval feather, and the left buttock feather is two inches long. Goes dry two months.

The third order has buttock feathers three inches long, a triangular thigh feather right side, and goes dry three months.

The fourth order has buttock feathers four inches or longer, a large triangular right-side thigh feather, and goes dry four months.

The fifth order has larger bristly buttock feathers, a larger triangle, and goes dry five months.

The sixth order is a very little bicorn, and there are bristling hairs all over the buttocks. Dry six months.

The bicorn counterfeit has the same marks in each order and two large coarse buttock feathers.

THE SIXTH CLASS, OR DOUBLE SELVEDGE ESCUTCHEON.

The first order has two slender lists running from the bottom of the udder to the tail, with a broad band of descending hair between, reaching to the base of the udder. Thigh wings eighteen inches wide, as in all first-order escutcheons. Dry one month.

The second order has the descending band of hair terminating four inches above hind teats and the thigh escutcheon narrower. Dry two months.

The third order has narrower fillets, descending band stops six inches above teats; thigh wings are still narrower. Dry three months.

The fourth order has coarser hair, descending band twelve inches below vulva, a crescent thigh feather on right thigh. Dry four months.

The fifth order has still coarser hair, the two fillets are ragged, the central band descends to the udder, a triangular thigh feather in both wings. Dry five months.

The sixth order has very small ragged fillets, the right reaching half way up, the thigh wings not discernible. Dry six months.

The batard has the fillets terminating in two large coarse buttock feathers.

THE SEVENTH CLASS, OR DEMIJOHN ESCUTCHEON.

The first order has two oval feathers, and may have two small buttock feathers. The escutcheon is eighteen inches wide on thighs, and the upper part rises like a flandrine, but terminates in a level top four to eight inches below the vulva. Dry one month.

The second order has one left oval feather and buttock feathers two to three inches long. Goes dry two months.

The third order has the left buttock feather about five inches long and a right crescent thigh feather. Goes dry three months.

The fourth order has longer buttock feathers and a triangular right thigh feather. Dry four months.

The fifth order has larger buttock feathers and two large triangular thigh feathers. Dry five months.

The sixth order has a very small demijohn and very large buttock feathers. Dry six months.

The batard has enormous buttock feathers.

THE EIGHTH CLASS, OR SQUARE ESCUTCHEON.

The top of this escutcheon is a narrow list joined to the left corner of the top of a demijohn escutcheon. The first order has two oval feathers. Goes dry one month.

The second order is the only second order which Guenon gave the two oval

feathers. There is a buttock feather on the right of the vulva. Goes dry one month.

The third order has a right buttock feather three inches long, a right triangular thigh feather, and left crescent thigh feather, and goes dry three months.

The fourth order has the list ragged in the upper part, the right buttock feather four inches long, the wings very small, with a triangular right side thigh feather. Dry four months.

The fifth order has the fillet still more ragged, the buttock feather five inches long, a triangular thigh feather on each side. Dry five months.

The sixth order is scarcely recognizable. Dry six months. The batard is distinguished by a very large coarse buttock feather on right of vulva, and the fillet on the left of the vulva has bristling hair.

THE NINTH CLASS, OR LIMOUSINE ESCUTCHEON.

The first order has the two oval feathers and wide thigh shield. The upper part terminates four to eight inches below the vulva in a sharp point like a steeple. There may be two small buttock feathers. Goes dry one month.

The second order has one left oval feather and two buttock feathers about three inches in length, the left being the longer, as in all the escutcheons. Goes dry one month.

The third order has the left buttock feather still more elongated; the thigh wings are more contracted. Goes dry three months.

The fourth order has larger buttock feathers; the whole escutcheon is lower and rounded. Goes dry four months.

The fifth order has very long buttock feathers. The wings are small, and each has a triangular thigh feather. Goes dry five months.

The sixth order is so small as to be scarcely distinguishable; the buttock feathers are very long and ragged. Goes dry six months.

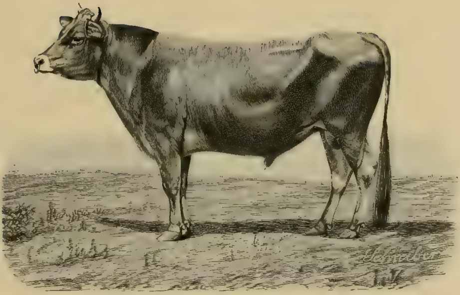
The batard, or counterfeit orders, have the same marks in each order, except that the buttock feathers, as in every class, are larger, coarser, and very bristling.

THE TENTH CLASS, OR CARRESINE ESCUTCHEON.

The first order has an escutcheon of full width, but terminated at a line level with the top of the udder. There are two oval feathers and two very small buttock feathers. Goes dry one month.

The second order has one oval feather. The left buttock feather is elongated; the thigh wings are contracted. Goes dry two months.

The third order is still more contracted. The buttock feathers are longer, and there is a triangular thigh feather in the right wing. Goes dry three months.



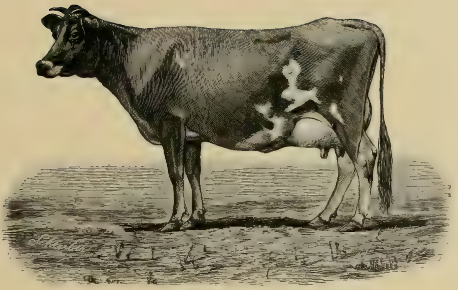
HIPPARCHUS 11,672.

AT 2 YEARS OLD.

Orange Peel-King Type.

BRIGHTSIDE HERD.

R. M. HOE, 504 GRAND STREET, NEW YORK.



FILLPAIL 2d 24,388.

AT 4 YEARS OLD.

Imported by T. S. Cooper.

Khedive—King—Fillpail Type.

A. N. Martin, Summit, New Jersey.

The fourth order has a triangular gore in each wing. The buttock feathers are long and bristling. Goes dry four months.

The fifth order has very large buttock feathers and very small escutcheon. Goes dry five months.

The sixth order does not rise to the middle of the very small udder. The buttock feathers reach almost down to the udder, and are bristling. Goes dry six months.

The carresine counterfeits have all the marks of the six orders and immense broad buttock feathers in every order.

Batard, or counterfeit cows, in all the classes and orders, only differ from free cows in losing their milk very soon after impregnation.

Guenon arranged cows, according to amount of milk, in three sizes—large, medium, and small. As the Jersey may be properly called a medium-sized cow, the synoptic tables here given are suitable for the Jersey breed.

CHART OF THE GUENON SYSTEM, SHOWING THE DAILY MILK YIELD FOR MEDIUM-SIZED COWS, IN QUARTS.

No. of Class.	Class.	First Order.	Second Order.	Third Order.	Fourth Order.	Fifth Order.	Sixth Order.
1.	Flandrine.	20 qts.	16 qts.	12½ qts.	9½ qts.	6 qts.	3 qts.
3.	Selvedge.	20 "	16 "	12½ "	9½ "	6 "	3 "
4.	Curveline.	20 "	16 "	12½ "	9½ "	6 "	3 "
5.	Bicorn	20 "	16 "	12½ "	9½ "	6 "	3 "
7.	Demijohn.	20 "	16 "	12½ "	9½ "	6 "	3 "
2.	Left Flandrine	18 "	15 "	10½ "	7 "	4 "	2 "
6.	Double Selvedge.	18 "	15 "	10½ "	7 "	4 "	2 "
8.	Square	18 "	15 "	10½ "	7 "	4 "	2 "
9.	Limousine	16 "	12½ "	9½ "	6 "	3 "	2 "
10.	Carresine	16 "	12½ "	9½ "	6 "	3 "	2 "

It will be seen that the escutcheons are arranged in this table in order of merit.

CHART SHOWING DURATION OF MILKING PERIOD FOR PREGNANT COWS BY NUMBER OF MONTHS EACH ORDER WILL PRODUCE MILK.

No.	Classes.	Orders.					
		1st.	2d.	3d.	4th.	5th.	6th.
1.	Flandrine.........	9	7	6	5	4	3
2.	Left Flandrine..........	9	7	6	5	4	3
3.	Selvedge...............	9	7	6	5	4	3
4.	Curveline.......... ...	8	7	6	5	4	3
5.	Bicorn.................	8	7	6	5	4	3
6.	Double Selvedge........	8	7	6	5	4	3
7.	Demijohn...............	8	7	6	5	4	3
8.	Square..................	8	8	6	5	4	3
9.	Limousine	8	7	6	5	4	3
10.	Carresine	8	7	6	5	4	3

Number of Months Dry.

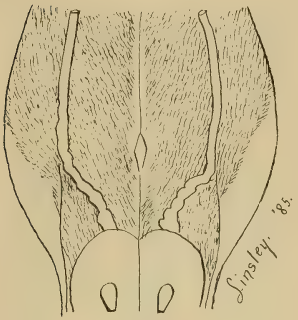
1.	Flandrine..............	0	2	3	4	5	6
2.	Left Flandrine..........	0	2	3	4	5	6
3.	Selvedge...............	0	2	3	4	5	6
4.	Curveline	1	2	3	4	5	6
5.	Bicorn............... ..	1	2	3	4	5	6
6.	Double Selvedge.........	1	2	3	4	5	6
7.	Demijohn...............	1	2	3	4	5	6
8.	Square..................	1	1	3	4	5	6
9.	Limousine..............	1	2	3	4	5	6
10.	Carresine...............	1	2	3	4	5	6

THE FORE-ESCUTCHEON AND THIGH OVALS.

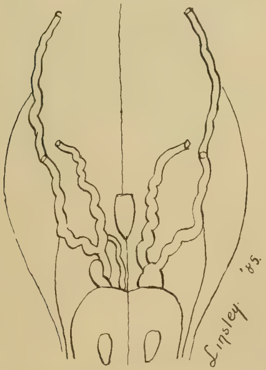
Guenon did not think it necessary to observe the fore-escutcheon, but many of our best breeders of Jersey cattle regard the fore escutcheon of equal importance with the posterior escutcheon, in judging of the productive and breeding qualities.

The fore-escutcheon consists in the forward growth of hair on the belly of the animal. It is sometimes very large, and extends nearly to the fore-legs, and on the sides it often sweeps over the margin of the curtain, and forms large waves or curls on the sides of the body.

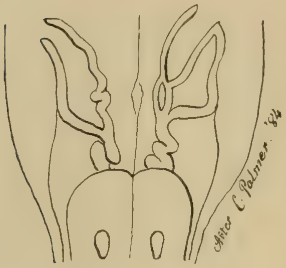
Many great butter cows have a large fore-escutcheon, notably the wonderful cow Mary Anne of St. Lambert 9770, and herewith is shown a diagram of her fore-escutcheon, drawn by the author from memory.



FORE-ESCUTCHEON OF MARY ANNE OF ST. LAMBERT 9770.



FORE-VEINS OF JERSEY BELLE OF SCITUATE 7828, EXTENDING TO THE SHOULDERS.



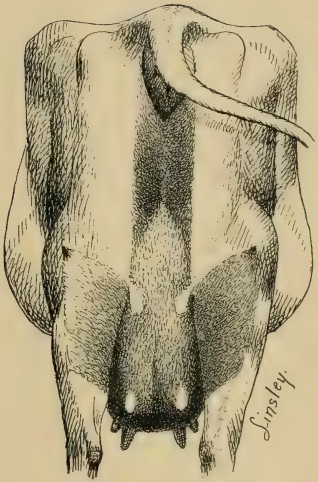
Fore-Veins of Value 2d 6844.

THIGH OVALS.

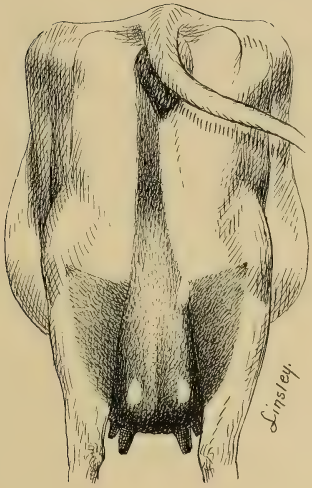
Many writers upon Jersey cattle have mentioned a feature that seems to have escaped the notice of Guenon, and that is a feather of an oval shape at the juncture of the thigh wing with the upright portion of the escutcheon. In cows this feather appears at the top of the udder on each side, dipping down from the thigh about two inches. (See Fig. VIII., p. 59, and the escutcheon plates.)

The thigh oval feather is formed of down-growing hair, and is exceedingly fine and soft, and always indicates superior quality in a Jersey of either sex. In the bull it is smaller, and dips down upon the thigh or upon the scrotum. A good thigh oval feather should not be more than three inches in length, but sometimes they extend so far as to coalesce with the lower oval feathers, thus forming a long band of down-growing hair on each hind-quarter of the udder.

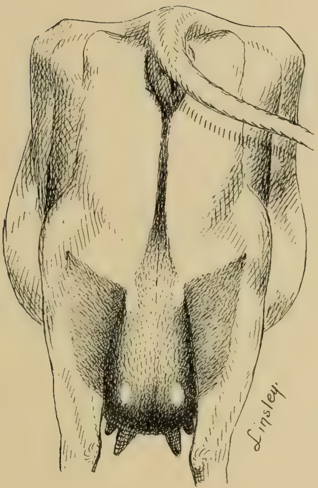
The ten plates which follow show an ideal escutcheon of each class. I have added the thigh ovals, with the exception of the double selvedge, of which I have only seen one specimen, and the escutcheon of the bull. The flandrine, selvedge, curveline, bicorn, and demijohn escutcheons are the best classes, and for the Jersey there is no better escutcheon than a perfect curveline.



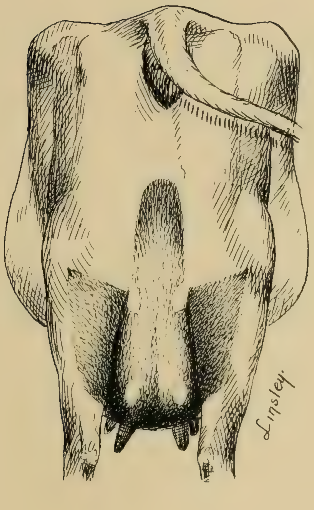
FLANDRINE ESCUTCHEON.



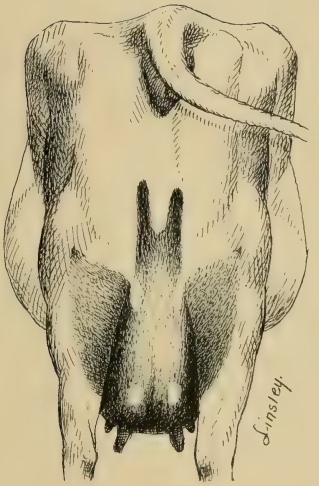
Left Flandrine Escutcheon.



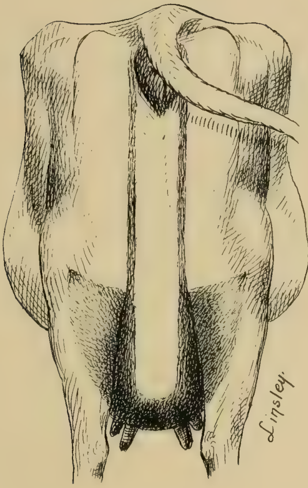
Selvedge Escutcheon.



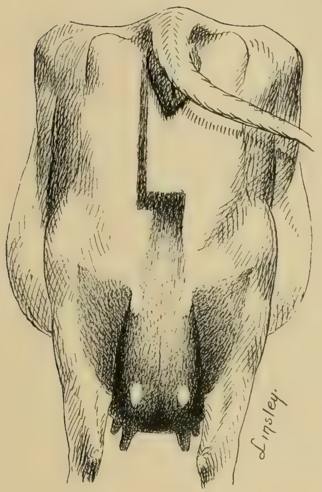
Curveline Escutcheon.



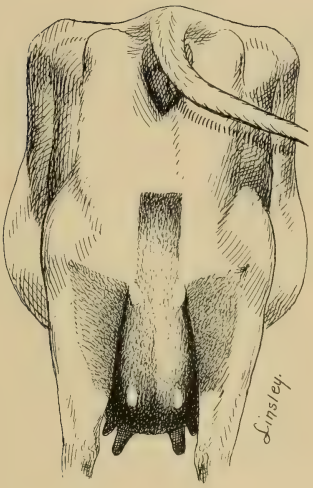
Bicorn Escutcheon.



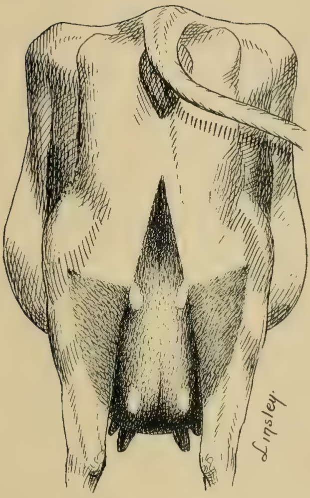
Double Selvedge Escutcheon.



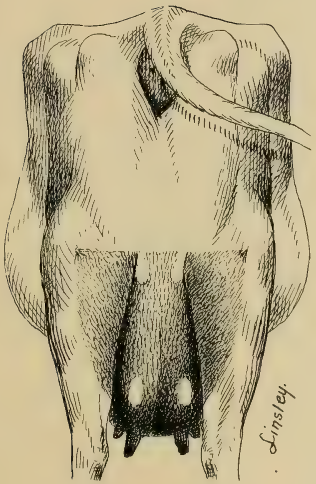
Square Escutcheon.



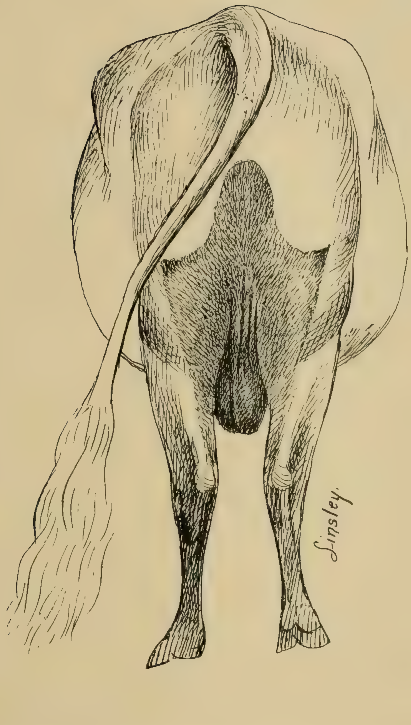
Demijohn Escutcheon.



LIMOUSINE ESCUTCHEON.



Carresine or Level Escutcheon.



CURVELINE ESCUTCHEON OF THE BULL YOUNG MERCURY 7485.

BRED AND OWNED BY WILLIAM SIMPSON, NEW YORK.

The fore escutcheon of this bull covers more than half the belly.

THE ESCUTCHEON OF THE BULL.

According to Guenon, the escutcheon of the bull starts from the fore-part of the scrotum, extends within and above the hocks, spreads over the hinder surface of the thighs, and in the higher orders of some classes ascends as high as the anus. Those bulls whose escutcheons, in form and dimensions, resemble those of cows of the higher orders, are well adapted to the procreation of offspring of good milking qualities. A bull is well marked and a good breeder when there is no invasion of descending hair into the ascending hair of his escutcheon; and the escutcheon is of large dimensions, in proportion to the size of the animal, and is covered with very fine hair.

"Bulls, like cows, may be arranged in ten classes, of which each class comprises several orders, and every order three sizes. I shall only distinguish three orders in each class, which I shall designate as good, fair, and bad. The same distinctions could be observed as in cows."

The defects in the escutcheon of the bull are coarseness of hair, diminutive size, angular invasions of hair on the thighs, or an oval feather of descending hair an inch wide by two or three inches in length on the inside of the thigh about the middle of the escutcheon and covered with long thick hair.

The fair escutcheon of the bull may be compared with the third and fourth order in cows.

The good escutcheon is equivalent to the first order in cows.

SIGNIFICANCE OF THE SCALE OF POINTS.

The scale of points, including the fore and hind escutcheon, is recommended as a guide in the purchase of animals and as an aid in breeding.

The milk and butter quality, when demonstrated by churn tests, shows what the cow can do, and encourages the breeder to look for the same quality in her male and female progeny.

The escutcheon, according to Guenon, "is the only incontestable characteristic sign that can enable one to discern, by simple inspection, the aptitude for milk production of each animal." Those who decry the escutcheon always like to show a herd of well-escutcheoned animals. The escutcheon when perfect is also one of the chief elements of beauty in a Jersey.

The skin color is an indication that the cow, being richly colored within the ears and on other parts, especially if she retains the color throughout the year (she will show most color when fed on green food), will give a golden tint to her butter in midwinter.

The barrel, if large and capacious, shows that the animal has constitutional vigor and room for the laboratory of digestion and assimilation of food.

The general appearance should be bony and lean, showing that the animal uses the udder and all the lacteal vessels for the special purpose of utilizing all the food elements for the production of milk and cream.

The fore-udder should be full but well rounded rather than square. The angular udder must give place to the spheroid—free from fleshiness, and a true milk-secreting organ.

The hind-udder should project far out from the thighs with a round outline, and well tucked up in the twist. The whole udder should have a spheroidal form, and its supporting ligaments must be so strong as to prevent it from becoming pendent, even in advanced age.

The udder quality should be soft, supple, and elastic, so as to milk empty. There need be only sufficient vascularity to make healthful milk-glands. The udder should have a silken and unctuous touch; the hair very short and fine—a butter udder.

The veins show a capacity for free circulation according to size. The bull should be credited with a "milk" vein, when marking for prizes.

The teats should be just large enough to fill the grasp of a man's hand, and yield the milk upon slight pressure, but never leak. The teats must be kept free from warts and sores by proper treatment. The nipples of the bull, if equal in size and of good length, and set wide apart, indicate the same quality in his heifers.

The high rump is an important point to cultivate; it indicates vigor and less liability to abortion. It also adds much to the symmetry and beauty of the animal.

The thin thigh belongs to the creamer, the round thigh to the beef animal. A curl on each hock is a good sign.

The thin mellow hide is a part of that general make-up which denotes the creamer. The very large pendent navel and loose skin on the belly are associated with a capacious and flexible udder.

Hair as unctuous as vaseline is a prediction of butter in the churn. Avoid dry, wiry hair in every animal, but cultivate the soft, fine coat.

Hips of great breadth indicate great abdominal capacity and room below for an immense udder. Fineness of bone is indicative of fine quality in every tissue of the body.

A level back is an indication of strength, and gives symmetry to the form. An old cow may sway a little below the line.

The double chine is associated with fully developed lacteal and generative organs and first-order escutcheons. When you can lay the fingers in the spaces between the spines, you have a cow with broad hips, large udder, and a very broad escutcheon.

The long, thin neck of the cow is to be matched with the long, well-arched, high-set neck of the bull. A short thick neck indicates fat on the ribs and kidneys.

Large eyes, which for gentleness of expression rival those of the gazelle, are the special feature of loveliness in a Jersey cow. The bull should have a kind but lively eye. The one indicates docility, the other vigor and power.

The lively and playful bull indicates a condition of vigorous health and potency. The gentleness of the cow is manifested by an undisturbed equanimity, a condition of perfect contentment, indifferent to all things except her cud, which she always enjoys when not feeding or sleeping. It is the business of the butter cow to keep the cud in motion.

The tail should be as long, as tapering, and as fine as possible. Such a tail, if tipped with a switch like the tail of a horse, indicates a very well-bred animal.

The shoulders cannot be too oblique or too sloping, and the good butter cow never lays up fat on her shoulder-blades while she is giving a full flow of milk.

The legs should be fine, having flat, hard bones, which with small feet are indicative of good breeding and fine quality.

Thin withers also indicate fineness of breeding, and belong to the wedge-form. Thick withers indicate more lung power and usually a greater feeding capacity ; but such animals are liable to become fat, while the thin withers indicate the milking form.

A widening at the crops indicates constitutional stamina and strong vitality.

The deep chest without great breadth indicates a sufficient power of respiration for good health and a form that is compatible with production of milk and cream rather than beef.

The small, lean head, long and tapering, indicates much milk ; the short, square head, beef. The arched crown is a beautiful characteristic of the finest Jerseys.

The dished face is attractive and not incompatible with the greatest productiveness.

Breadth between the eyes indicates sagacity and a high degree of bovine intelligence, as well as beauty.

The ash-colored fillet is a striking feature in the Jersey race. If the muzzle is slightly turned up, nostrils wide, the mouth broad, and the masticatory muscles stand out roundly from the muzzle and cheek, it is a good combination of features for business and beauty. A black nose is supposed to be characteristic of the Jersey breed, though not any more essential to purity than a black tongue or a black switch.

The small ear well fringed indicates not only fine breeding but constitutional vigor. The fringe is also a protection from flies.

Horns of translucent amber with black tips are very ornamental, especially if small in size and slender, and if they have a natural crumple, or have been trained to droop or curl about the face. They are as useless as they are ornamental, and have less significance than any other point.

Besides the scale of points, with which one cannot be too familiar, there are several other considerations which need to be remembered in judging of cattle.

1. The race peculiarities.
2. The family traits.
3. The degree of inbreeding.
4. The age.
5. The size.
6. The system of management and care.
7. The health.
8. The variety, quality, and amount of food.
9. The special power to assimilate food.
10. The quality of the cow's milk, cream, and butter.
11. The season of the year, and the weather.
12. The period of gestation.

By familiarity with the animals and with every technicality of these descriptions and points, any one with an eye for a cow can become expert in the selection of the best stock, and while they are yet young calves may apprehend their future excellence.

THE PRINCIPLES OF BREEDING.

Of the ancient methods of cattle-breeding we have little knowledge. The oldest record of skill in the art is found in the Book of Genesis, where Jacob, who was the superintendent of the herd of his father-in-law Laban, the Syrian, after fourteen years of familiarity with Laban's cattle—he had bred cattle, however, all his life, and was past fifty years of age—proposed to take, as his wages, only the spotted cattle. From this it would appear that spotted cattle were then a great rarity, a strange freak of nature not only among sheep, goats, camels, and asses, but bovines. Laban readily assented to the proposition, and Jacob, by consummate skill and selection of the strongest cattle, soon had an immense herd of spotted cattle, notable for their strong constitutions, and, as a sequel, his wages were "changed ten times." This record of breeding, brief as it is, has much that is suggestive to the modern cattle-breeder. Jacob had a plan, adhered to it, and was successful *in changing the colors of cattle; in improving their constitutional vigor, and in overcoming the habit of abortion among his herds.* Some might add that, according to the record, there was divine interposition in his behalf. Well, the record also states that Jacob sought for divine blessing. All modern breeders would also do well to follow his example, and also make confession of the blessing.

The object of the breeder is to produce at will, not by luck or chance, perfect specimens of the race, that shall combine all the qualities desired. Most of the modern breeds of cattle have been developed by a slow, hap-hazard process. Some of the breeds in England have been formed by men of genius after a well-considered

plan. The best families of Jerseys have been made by method. The results of the methods practised in England for the last century and in America for a shorter period show conclusively that breeds or races of domestic animals, to be successful and profitable, must combine a few peculiar excellencies which are to be developed to their fullest extent regardless of all other qualities that are incompatible with the object sought.

The dairy breed must have the wedge form and lean general appearance, compatible with a long life devoted to formation of tons of cream in the udder, while the beef animal must have the square form, and make a mountain of marbled meat, rich in osmazome, at or before three years of age. The two types are wholly distinct, and cannot be blended in one breed. As soon think of winning races with the heavy muscles of the cart horse as to win at the churn or cheese vat with a beef breed.

The possibilities of achievement in bringing the Jersey to a high average standard of productiveness have been at least partially shown by the efforts of a few skilful breeders—notably by R. M. Hoe, of New York, O. S. Hubbell, of Connecticut, and Philip Dauncey, in England. Mr. Dauncey began in 1826, and for forty years worked with three distinct objects in view: first, a high average butter yield; second, constitutional vigor; third, coats of uniform style of color, entirely free from patches of white. All these objects were successfully achieved. Mr. Hubbell has accomplished the foundation of a family noted for great yields of butter, beautiful color and symmetry, and remarkable uniformity of excellence. Mr. William Simpson, of New York, is also pursuing a scientific method in breeding.

The great problem that confronts every breeder is that of duplicating at will the animals he has selected as his models.

A thorough knowledge of the history of breeding and the special methods of successful breeders, a taste for the art, and a love for the animals, if combined with a genius for the work, are auspices of great results.

I believe that the laws of breeding may be formulated in such a manner as to insure success to the man of average skill and the requisite education.

ATAVISM.

When the orchardist, by combining the qualities of two excellent fruits, produces, out of many thousand seedlings, one of delicious quality, he very well knows that he cannot reproduce the same or an equally good fruit short of many very tedious experiments, perhaps not in a lifetime, by the process of breeding. The union of two animals produces always a new seedling which varies from the parents more or less widely.

This variation proceeds from the law of heredity, that a seedling represents the sum of the combined qualities of all its ancestors operative at and subsequent to the time of sexual union. The most prepotent force in procreation may revert to some ancestor five, ten, or twenty generations distant, so as to reproduce in all their force of individuality the features of one noted for great merit or marked inferiority. This peculiarity of tracing to a remote ancestor is called *atavism*, and signifies likeness to "an old grandfather."

To avoid the bad influences of atavism, and utilize the good, is the province of the skilful breeder. The orchardist, to avoid the inconvenience and delay resulting from atavism, continually resorts to budding and grafting, perpetuating the identical variety by offshoots. The breeder must assimilate in dealing with animal life as nearly as possible to the process of the orchardist with plant life.

TERMS RELATING TO PURITY OF BLOOD.

A *thoroughbred* or *purebred* animal is one of a race that can be traced back to one common ancestry in both the male and female lines, with close in-and-in breeding for seven or more generations.

A *fullbred* animal is the result of breeding a thoroughbred male to a female of another breed, and successively to her progeny for *six* generations. Thus the progeny of a thoroughbred bull and a native cow gives a female with 50 per cent. of thoroughbred blood, which cow, mated with the same or another thoroughbred bull of the same breed, gives 75 per cent. of the pure blood. The next generation gives $87\frac{1}{2}$ per cent. of pure blood. The fourth generation gives $\frac{15}{16}$, or $93\frac{3}{4}$ per cent., of thoroughbred. The sixth generation gives $\frac{63}{64}$, or $98\frac{7}{16}$ per cent., of pure blood, or a *fullbred*, very nearly.

A *crossbred* animal is the progeny of two thoroughbred animals of different breeds.

A *grade* animal is one that possesses any degree of thoroughbred blood below a fullbred. A low grade has less, and a high grade more than 50 per cent. of thoroughbred.

A *scrub* animal is one whose pedigree has no quality of uniformity or of thorough selection in either the male or female line, *and always gives the highest risk of atavism* toward inferiority in the progeny.

PREPOTENCY.

That peculiar power which is possessed in a very marked degree by a few animals of either sex, of transmitting to their progeny all the striking individual characteristics of the parent, so that the descendants have a uniform resemblance and quality, is called *prepotency*. It is a faculty which implies a special accumula-

tion of vital force in the generative system, in common with all the other departments of the organism, and is not to be confounded with the narrower term, potency, which refers to the physical health of the male generative faculty, regardless of powers of transmission of quality. This element of prepotency may consist in the ability to transmit inferior or mediocre qualities, as well as those of the superlative degree of excellence. The breeder wants animals that overcome atavism by prepotency of the highest order.

Atavism is usually a result of crossing two varieties of the same species, or if it occurs in a thoroughbred family, it is the result of an inharmonious union.

If the breeder could follow the example of the orchardist by budding, the uncertainties of breeding would be neutralized. A seed is but a modified bud; the animal is analogous to the same process of development. The breeder cannot bud from his model, but by a certain formula he can in time produce an animal that shall be nearly identical in blood elements with the selected model.

IN-AND-IN BREEDING.

There is no subject upon which current notions are so wide from the facts as the mating of near kin. A prevalent notion exists that in some mysterious manner the union of the blood of near relations is harmful. All sorts of disasters in man and animals have been attributed to the union of kindred blood. The history of man, and the records relating to the natural history of animals and the science of breeding, show that this current notion is fallacious in the extreme.

According to the Book of Genesis, Eve was identical with Adam. For the first twenty-five hundred years of human history marriage between full brother and sister or half brother and half sister was the recognized order of society. Moses, the greatest man of antiquity—seer, lawgiver, poet, historian, judge, ruler, and leader of a great people just freed from bondage, was the son of his aunt; while his father was also his double uncle. His mother was a daughter of Levi, and his father a double grandson of the same Levi. His brother Aaron and sister Miriam were also highly distinguished for ability. These were the ages of longevity for the human race. From Noah to Moses the average age, for sixteen generations, was nearly three hundred years. To show how close was the consanguinity, I give a chart of the pedigree of Moses. If the lines were all complete, the closeness would probably be still more marked.

I have given this pedigree to illustrate the facts of history, and to show that the closest consanguinity in the human family is not a hindrance to the highest physical and mental perfection. On the contrary, was not this mingling of kindred blood a cause for the great qualities which Moses illustrated? Was the law of marriage which he afterward gave based upon physiological or sanitary necessity, or was it simply relative to a system of social ethics? If the existence of organic diseases

MOSES (Aaron, Miriam).

- Amram.
  - Kohath
    - Levi
      - Jacob
        - Isaac
          - Abraham
            - Terah
              - Nahor.
              - Sister.
            - Sister.
          - Sarah
            - Terah
              - Nahor.
              - Sister.
            - Sister.
        - Rebekah
          - Bethuel
            - Nahor, Jr.
              - Terah.
              - Sister.
            - Milcah
              - Haran.
              - Sister.
          - Relation.
      - Leah
        - Laban
          - Bethuel
            - Nahor, Jr.
              - Terah.
              - Sister.
            - Milcah
              - Haran.
              - Sister.
          - Relation (?)
        - Relation (?).
    - Levi's Wife.
  - Daughter of Levi
    - Levi
      - Jacob
        - Isaac
          - Abraham
            - Terah
              - Nahor.
              - Sister.
            - Sister.
          - Sarah
            - Terah
              - Nahor.
              - Sister.
            - Sister.
        - Rebekah
          - Bethuel
            - Nahor, Jr.
              - Terah.
              - Sister.
            - Milcah
              - Haran.
              - Sister.
          - Relation (?).
      - Leah
        - Laban
          - Bethuel
            - Nahor, Jr.
              - Terah.
              - Sister.
            - Milcah
              - Haran.
              - Sister.
          - Relation (?).
        - Relation (?).
    - Levi's Wife.
- Jochebed.
  - Levi
    - Jacob
      - Isaac
        - Abraham
          - Terah
            - Nahor
              - Serug.
              - Sister.
            - Sister (?).
          - Relation (?).
        - Sarah
          - Terah
            - Nahor.
              - Serug.
              - Sister.
            - Sister (?).
          - Relation.
      - Rebekah
        - Bethuel
          - Nahor, Jr.
            - Terah
              - Nahor.
              - Sister.
            - Sister.
          - Milcah
            - Haran
              - Terah.
              - Sister (?).
            - Sister.
              - Terah.
        - Relation (?).
    - Leah.
      - Laban
        - Bethuel
          - Nahor, Jr.
            - Terah
              - Nahor.
              - Sister (?).
            - Sister (?).
          - Milcah
            - Haran
              - Terah.
              - Sister (?).
            - Sister
              - Terah.
              - Sister (?).
        - Relation (?).
      - Relation (?).
  - Wife of Levi.

called for the law, the same organic diseases should have called for a prohibition of marriage without and beyond the prescribed degrees of consanguinity. It is certain that there is no evidence to show that consanguineous union in man or the lower animals ever did or ever can originate disease. On the contrary, we observe that where races diverse in physique and character are bred together the crosses lead to many imperfections. Huth has well said that if organisms are not nearly allied they can rarely be made to interbreed; and that the result of such crosses is an offspring of weedy growth, ill-balanced intellect, often as susceptible to unfavorable circumstances as an unacclimatized animal, and generally sterile; it is impossible that crossing can be considered in any way beneficial except inasmuch as it may relieve a possible hereditary tendency to disease. The Jews, since the Mosaic law, have frequently married cousins, and are the best variety of the human species to illustrate the principle of thoroughbred quality. For ages they have been maligned and persecuted in Eastern countries, and have suffered more hardships than any other people; yet they are possessed of greater viability than any other known race, and can thrive in every variety of climate on the earth, while subject to all the vicissitudes of commercial life. Where other European races would perish, the Jew flourishes and grows rich. Consanguinity is the law among most races of animals in a state of nature, especially those that are polygamous, as cattle, sheep, deer, and antelopes. In herds of wild horses, and also of the wild boar, it is usual to find but one adult male. The elephant, the gorilla, the lion, the ostrich, and many species of birds are polygamous, which always indicates the closest forms of in-and-in breeding perpetuated from the beginning of creation.

IN-AND-IN BREEDING OF ANIMALS.—SHEEP.

Doctor Huth, in his great work "The Marriage of Near Kin," in the preparation of which he consulted one hundred and seventy-one different authors, after showing the fallacious character of the meagre statistics purporting to show ill effects attributable to consanguineous marriages, says: "No census could determine whether consanguinity can be a primary cause of disease. For that we must interrogate nature, as she has already been so successfully interrogated on other physiological questions. We must experiment on the lower animals, since we may not experiment on man. Generation varies so little in its essential characteristics from the lowest organisms to the highest, that observations deduced from the breeding of domestic animals may very safely be applied to man. An animal properly bred in-and-in, and a wild animal, is each perfect according to its circumstances. Alter the circumstances, and the animal is at once unfit for its place.

"From the breeder's point of view, in-and-in breeding improves the breed, because it suppresses those qualities which are useless, and develops those which are

useful, whether it be for racing, for wool, for the butcher, or for any other purpose; and without in-and-in breeding he cannot alter an animal to suit his purpose.

"Naturally, persons with that preconceived notion which every one is bound to have on this subject who has not studied it are apt to consider any evil result observed in the course of in-and-in breeding as caused by that kind of breeding in animals, without any previous examination whether there may not be other causes to account for it.

"In the study of these cases, therefore, as in others, we must remember that one fact showing the harmlessness of in-and-in breeding is worth a hundred tending to show their harmfulness; since in the former consanguinity is still a factor, but in the latter we are ignorant what other factors may have come into play. Let us now proceed to facts.

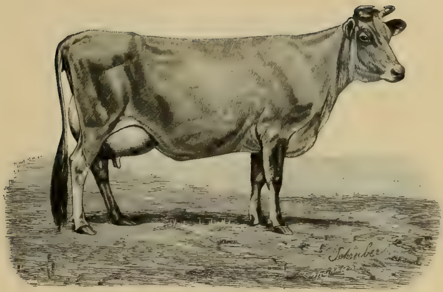
"'M. Allie,' says M. Boudin, 'after a long experience, is of opinion that the system of in-and-in breeding is ruin to sheep. A flock at Petit-Bourg,' he says, 'has diminished greatly in value since it passed into other hands, and this system has been practised.' The observations of Stephens led him to the same conclusion: the progeny, he says, though improved in figure, firmness of bone, etc., are nevertheless delicate-skinned, and therefore liable to the attacks of insects and to inflammation; but this evil is only the result of long-continued in-and-in breeding, and by no means the immediate result.

"M. Aube asserts that sheep will produce a dark kind if bred in-and-in, which he explains as a step on the road to albinoism. While Mr. Giblett, quoted by Walker, asserted that sheep bred in-and-in on Bakewell's principle are fitter for the tallow-chandler than for the kitchen.

"On the other hand, M. Beaudouin gives the following account of a flock of three hundred merinoes bred in-and-in for a period of twenty-two years: the animals originally came from Saxony, were renowned for the purity of their blood, and had only been a few years in the Côte d'Or, when, in 1840, he commenced his observations. At that time, though suffering from no particular disease, the sheep were laboring under general debility, seemingly attributable more to a want of acclimatization than anything else. He began by a little judicious selection, eliminating about 15 per cent. yearly, and the flock soon became remarkably strong and healthy. There was no sign of sterility—altogether, perhaps, the cases of cryptorchis (non-appearance of testicles) and monorchis (single testicle) were not more than 6 per cent., while in the females there were even fewer cases of barrenness. Cases of duplicate organs were about 5 per cent.; and in 1859, a year when these cases were unusually frequent in all the flocks about, there were as many as 7 per cent. in his. The sexes were produced in nearly equal numbers, and cases of miscarriage were not more numerous than among the neighboring flocks. Far from degenerating, they became finer and far more to be depended upon to reproduce their proper type than

is ordinary in flocks when crossed. He concludes with the declaration that, in his belief, inbreeding, combined with a moderate amount of selection, has no evil effect. Close interbreeding, says Mr. Darwin, has perhaps been continued longer with sheep than with cattle; but perhaps the nearest relations have not been so frequently matched. Messrs. Brown, during fifty years, have not crossed their excellent flock of Leicesters, nor since the year 1810 has Mr. Barford crossed the Foscote flock. This gentleman asserts that when two nearly related individuals are perfectly sound no degeneracy is produced in their offspring by their union; or, in other words, that there is no danger by in-and-in breeding unless through morbid inheritance. But, on the other hand, he does not pride himself on breeding from the nearest relatives; and I may add that such is not a breeder's object: he does not choose a relative for its relationship, but for its qualities. In France the Naz flock has been bred in-and-in for sixty years, without the introduction of any strange blood. Ferdinand and Louis Fischer started a flock of one hundred ewes of one family and four rams of another; and these families have since been interbred without the admixture of a drop of fresh blood. Mr. Atwood's entire flock, which was so celebrated that it is now scattered by colonization into all the States of the North American Union, originated from a single impregnated ewe; and neither she nor any of her progeny or descendants while in his hands were interbred with any sheep not descended exclusively from Colonel Humphrey's flock, from which she herself came. Mr. Hammond bought a small number of Atwood's flock in 1844, and he has since interbred solely between the descendants of these identical sheep. The Spaniards in their sheep-breeding guard against any admixture between the different cabanas, and they have been bred in-and-in for ages. Hallam says that the fineness of Spanish wool is considered to be owing to an importation of English sheep about the year 1348, and again about 1465, in return for which the Spaniards exported horses. McCulloch says that the Spaniards themselves ascribe their superior breed of sheep to the introduction of a few from England by Catherine of Lancaster in 1394; while elsewhere he says the merino breed is said to have been introduced from Barbary. These importations could not have been very great, and, as it appears, the Spaniards have since bred them in very closely, with the result that they became so valuable that up to the treaty of Basle their exportation was forbidden. By that treaty the French were allowed to buy five thousand merino ewes and as many rams; and from this stock the English sheep, which had also been carefully bred, were improved, while those of France and Germany were almost replaced by them. These sheep, says Mr. Huzard, have been ever since bred in-and-in at Rambouillet, and have never been crossed except by a second importation under the First Consulate. The nearest relatives are generally put together, for the rams are usually put to their own progeny for several generations, and this without any sign of degeneration. The flocks of Tessier, de Sylvestre, Perrault, Girod, and others testify to the same fact. The merino, when introduced

into Germany, was so immensely superior to all the native breeds, that it was everywhere accepted with enthusiasm. In Saxony the greatest attention was paid to them, chiefly, however, as regards the *quality* of their wool, not as regards the quantity and quality as well as quality of the meat, as in England. To this end they were kept in stables and fed on heating food, such as grain and hay, throughout the winter. The result was an unexampled quality of wool; but the animals became a small and puny race. In England the breed of sheep was already so good that men were prejudiced in favor of their own breeds. Many merinos, therefore, fell into the hands of men who had no experience in breeding, and they were mismanaged; but in the hands of at least one practical breeder they were eminently successful. He reports on them: 'Soon after the king's flocks were imported . . . I purchased a considerable number of sheep from them, and selected from those of the Negrette blood, as being the largest sheep and carrying the most and softest wool. These I continued to keep strictly pure, having no other sheep whatever, and I drew rams from the royal flock, so long as that was kept up, since which I have depended wholly on my own. By due attention in breeding, the wool, far from degenerating, has annually improved in softness and fineness, and these qualities have become much more uniformly even throughout the fleece; so that I now obtain for the whole a price beyond what any foreign wool brings in bulk in an unsorted state, while the fleeces of our own flock are full double the weight of those of the Saxon sheep. It is right, however, to state that the staple of my flocks having arrived at a length beyond that of other merino sheep, has rendered it fit for combing, thus enhancing the value. The form of the sheep is also highly improved, while the disposition to fatten equals that of the Southdown. The mutton is of the first quality, and I can readily have for fat wethers the highest price which any mutton brings in the London market.' The justly celebrated New Leicester breed of sheep was entirely created as a distinct breed by this method. 'Taking the native sheep,' says Macdonald, talking of Bakewell, 'he reduced his size, gave him small offals, induced him to lay on flesh and fat all along the breech, sides, shoulders, flank, and neck. He opened his wool, and also reduced it in weight, and a little in length. He increased the tendency to lay on fat in proportion to the food consumed, and made the animal take on fat at least a year or two earlier, thus enabling two or three animals to be fed where one only was fed before. Nor was this change fitful or temporary; it was permanent and indelible; and for nearly a century the same breed of sheep has not only maintained its position, but has been used with more or less of success to improve nearly every breed in the United Kingdom, and has, moreover, more or less displaced almost every other breed.' A correspondent of Walker says: 'I have bred from rams from the same flock in Leicestershire for fourteen years, which flock has not had a cross since the year 1799.' Some of the new Leicester breed appear, however, to deserve the remark of the 'Bond Street Butcher;' for Sir John



MARY ANNE OF ST. LAMBERT 9770.

AT 5 YEARS OLD.

Stoke Pogis—Marjoram—Victor Hugo Type.

OAKLANDS HERD.

VALANCEY E. FULLER, HAMILTON, ONTARIO, CANADA.

PRINCE POGIS 10,682.

AT 1 YEAR OLD.

Mary Anne of St. Lambert—Rob Roy—Splendid Type.

OAKLANDS HERD.

VALANCEY E. FULLER, HAMILTON, ONTARIO, CANADA.

Sebright said that Bakewell's principles were followed up too far; the propensity to get fat has increased so much that their stock has become small in size, delicate, and produces little wool. But another correspondent of Walker points out that a propensity for fat-getting and the production of the finest wool are incompatible; and it certainly appears from the fact that this breed has supplanted so many others that it cannot have degenerated. Too much fat is always a danger to a breed, for fat is a degeneration of tissue and a cause of sterility; and although by in-and-in breeding man is able to do a great deal in the way of alteration, he must still follow nature—he cannot go contrary to physiological laws; he can increase the qualities which he wishes to get chiefly only at the expense of qualities which he is content to do without; and can no more obtain an animal all fat with every other good quality than he can teach his breed to live without food. We must remember that ill-directed breeding is as bad when there are frequent crosses as when there are none; that it is selection which is the great improver, when properly directed, and that breeding in-and-in is only advantageous because it fixes the breed and obviates the necessity of crossing from an unimproved breed. Indeed, a careless cross may diminish size, just as careless in-and-in breeding may do so. The Romney Marsh sheep were made smaller in this way; so were the Teeswater, and so are the mongrels of the merino and Scotch, or the Southdown and Scotch breeds. The sheep of Scotland, says Dr. Copland, are very small, their fleeces fine and soft, their meat delicate and finely flavored. In many parts they have much deteriorated since the introduction of Southdown breeds. Indeed, the sheep themselves seem sometimes to have an antipathy to crosses, for on one of the Faröe isles it was observed that the half wild native black sheep would not readily unite with the imported white sheep. The Shetlanders also tried to improve their native breed of sheep by crosses, and failed signally. So bad are the effects of crossing an improved breed, which must necessarily comprise no very great numbers at first, that some persons keep their animals in different families, and thus while they retain consanguinity, any tendency to disease peculiar to one family from the soil, habit, or what not, is obliterated. On the other hand, so valuable is in-and-in breeding to perpetuate any peculiarity either caused by selection or by what is known as a 'sport,' that nearly all 'created' breeds have been produced in this way, and valuable breeds, such as the Ancon and Mauchamp, would have been entirely lost without it."

IN-AND-IN BREEDING OF CATTLE.

"A majority of the most celebrated breeders and improvers of English cattle, says Mr. Randall, have bred closely in-and-in; and this was necessary, since an improvement cannot comprise a large number at first. Bakewell was one of these breeders, and his Longhorns were for a considerable time closely interbred, though

Mr. Youatt says that they became delicate, and the propagation of their kind uncertain, a state which seems to have been due to bad management, for Bakewell himself was, as a rule, extremely successful. Knight once in the same season reared two young bulls of which the parents were nearly related; and both proved perfectly impotent, or at least failed to get a single calf; yet the females bred well enough while young. But another correspondent of Walker never found the generative power fail in consequence of in-and-in breeding of cattle; all that is necessary, he says, is to select carefully. The half-wild cattle kept in British parks, at Cadzow Castle, Chillingham, and Chertly are put forward as long-continued in-and-in breeding without any evil results by Culley, Dr. Brown, and Mr. Macdonald. These cattle were parked four or five hundred years ago, and are supposed to be the only remains of the ancient British cattle. Mr. Darwin, however, asserts that, compared to the wild cattle of South America, these are bad breeders; and Dr. Smith says that the Chillingham cattle now produce deviations from the original type of white, with black muzzles and red ears, which deviation he considers a degeneration. It does not follow, however, that this is a degeneration in the ordinary sense of the word; while it must be allowed that selection has not been practised with regard to their breeding, which would prevent any selection on their own part sufficient to allow of the intensification of any particular color, since, though the keepers may shoot these deviations from the original type, this will not prevent it in the first instance. The various colors are there, and it would be contrary to all the teachings of the evolution hypothesis if deviations did not occasionally occur, whether by sports, which would be rare in so in-and-in bred a herd, or by selection among themselves, as explained by Mr. Darwin in his 'Descent of Man.' The fact still remains, however, that these animals have been bred in-and-in for centuries, and still continue to breed without the help of crosses. The South American cattle are all descended from a few brought over from Spain and Portugal; the first by Garay, in 1580, and they have since increased to such astonishing numbers that, even in 1587, there were sixty-four thousand three hundred and fifty skins exported from New Spain. Vast herds of wild cattle are met with in all parts of the country, particularly in the plains of the southern provinces, where they exist in troops of twenty thousand to forty thousand; so that hides, jerked beef, horns, and bones have long formed leading articles of export from Brazil. On the Falkland Isles are herds of magnificent cattle, all descended from a few brought over from La Plata about eighty years ago. They are now breaking up into separate herds of different colors, the white, on the Highlands, breeding earlier than the others. I wish to draw particular attention to this natural segregation, which is also common in horses and sheep, and must be taken in connection with the tendency all polygamous animals seem to have to separate into families. Is this nature's horror of in-and-in breeding? Is this her delight in crosses? Price, the most

successful breeder of Hereford cattle on record, until twenty years ago, was a staunch advocate of in-and-in breeding; so were the Collings, Mason, Maynard, Wetherill, Bates, the Booths, Sir C. Knightly, Bakewell, Culley, Ellman, and others. The cow Restless, almost an historical animal, was the result of in-and-in breeding to a degree which would not have been possible to obtain in man, owing to his long childhood. The bull Bolingbroke was put to his half-sister Phœnix, and produced the bull Favorite. Favorite was matched with his dam, and produced the cow Phœnix, a celebrated animal. Favorite was then matched with his daughter, and the produce was the famous bull Comet; then with his daughter's daughter; then with his daughter's daughter's daughter, he being the father in each case. The produce of this last union, a cow, had 93.75 per cent. of Favorite's blood in her, and was bred to the bull Wellington, himself deeply interbred on both sides in the blood of Favorite, of which he had 62.5 per cent. in him. This union produced the cow Clarissa, an admirable animal. Clarissa was bred to the bull Lancaster, who had 68.75 per cent. of Favorite's blood; and this union produced the celebrated cow Restless, a breeding cow of Sir Charles Knightly's herd. The rule of Mr. Bates was always to put the best animals together, regardless of consanguinity. His 'Duchess' family, one of many families thus bred, ceased to breed; but he continued his former course of in-and-in breeding with triumphant success. Mr. Darwin, however, points out that though Bates bred in-and-in for thirteen years, yet during the next seventeen years he thrice crossed his herd, not to improve them, but to increase their fertility; while Nathusius, after a careful study of pedigrees, finds that no breeder has continued in-and-in breeding all his life. But, at all events, many have bred in-and-in far more closely than would be possible in man, for a number of generations longer than the average of human families exist. Mr. Price, whose Herefords were the best in the world in his day, declared he had not gone beyond his own herd for a bull or a cow during forty years. At Earl Ducie's sale, in 1853, a white heifer, only five months old, sold for four hundred guineas; she was the daughter of the bull Fourth Duke of York, who was by Second Duke of York, and her dam was Duchess 59, also by Second Duke of York; consequently the sire and dam were half-brother and sister. Many others which reach high prices are bred on this system. Mr. Gardner gives a most successful case of breeding between son and dam. M. Sanson points out that the Charolaise race of cattle has been greatly improved by in-and-in breeding. At Rambouillet in-and-in breeding was practised among the celebrated cattle of that place—a white hornless breed—with great success, until they were carried off by the cattle epidemic of 1815. M. Huzard also saw at Hohenheim and the royal farm of Holitzchen herds of superior animals, which were always bred in-and-in. In this way, says Mr. Darwin, were in all probability bred the Niata cattle, from one individual sport."

IN-AND-IN BREEDING OF SWINE.

"Breeders are more nearly unanimous on the evils of in-and-in breeding upon pigs, says Mr. Darwin, than perhaps on any other large animal. Mr. Druce says their constitution cannot be preserved without a cross. Lord Weston, the first importer of a Neapolitan boar and sow, bred in-and-in till the breed was in danger of dying out. Mr. J. Wright bred with the same boar from its daughter, granddaughter, great-granddaughter, and so on for seven generations, with the result that the offspring in many cases failed to breed; in others they produced few that lived, and of the latter many were without instinct to suck, and unable to walk straight. The last two sows were put to other boars, and produced several litters of healthy pigs. The best in external appearance produced during the whole seven generations was one of the last births, the sole one of the litter. She would not breed with her sire, and yet bred from the first trial with a stranger in blood. Nathusius imported a gravid sow from England, and bred closely in-and-in from the progeny for three generations, and with bad results; yet he esteemed one of the latest sows a good animal, and she bred well with a boar of different blood. On the whole, Mr. Darwin thinks, therefore, that in-and-in breeding does not affect the external form, while it affects the general constitution, the mental powers, and especially the reproductive powers. It must be remembered, however, that pigs are precisely those animals which are cultivated most for their fat, and that fat is very injurious to the health of any animal, and especially in the reproductive powers. Crossing, on the other hand, gives a tendency to reversion, and therefore a relief from fat. Indeed, as I have already explained, facts against the harmlessness of in-and-in breeding have very little value compared with those in its favor, and this is too generally overlooked. These pigs with but little hair on their bodies have by correlation also very bad teeth, and this may be prevented by crossing with hairy breeds. If a breeder, in beginning to breed in-and-in, chose an animal with rather less hair than usual, the progeny would have a tendency to bad teeth, bad digestion, and hence weakness; and he would naturally conclude, on finding that this weakness was cured by a cross, that it was the in-and-in breeding itself which caused it, and not mere inheritance. Mr. Hobbs divided his stock into three families, and by this device, though he kept the consanguinity, he avoided any chance inheritance of a morbid tendency, and obtained more latitude for selection. Mr. Coate, who won the prize for the best pen of pigs at Smithfield Club Show five times, says: 'Crosses answer well for profit to the farmer, as you get more constitution and quicker growth; but for me, who sell a greater number of pigs for breeding purposes, I find it will not do, as it requires many years to get anything like purity of blood again.' So Mr. Youatt says: 'A useful pig in these days may easily be bred; but if you want fixity of type, or, as it is well called, 'character,' you must adopt

pure blood.' Red pigs are 'invaluable for giving vigor and constitution to black breeds, when demoralized by over-coddling, over-feeding, and injudicious in-and-in breeding.'"

IN-AND-IN BREEDING OF THE HORSE.

"In Circassia there are six sub-breeds of horses, three of which are asserted, by a native proprietor of rank, almost always to refuse to mingle and cross while living a free life, and will even attack each other. It is a crime punishable by death to forge the mark of pedigree on an animal. The Arabs are equally particular as to their breeds, and their horses are better able to stand a change of climate than are European horses. Mr. N. H. Smith, long a resident among the Arabs, is of opinion that colts bred in-and-in show more blood in their heads, are of better form, and are more fit to start with fewer sweats than are others; but when the breed is continued incestuously for three or four generations, the animal degenerates. It is difficult to know what is meant by 'breeding incestuously.' Mr. Meynell, it appears, did not think breeding from sire and daughter or son and dam was close in-and-in breeding; and Mr. Bowly says the term in-and-in breeding ought to be applied only to animals having precisely the same blood, as own brother and sister. Now, breeding from such relationship as this, seeing that the male has only half the blood of the dam, and the female only half the blood of the sire, can scarcely be called pure in-and-in breeding, but may, on the contrary, if carried out with caution, be done with advantage. Our race-horses are derived from a mixture of Persian, Barbary, Arab, and native horses; but from the first they have been bred closely in-and-in. Rachel, the dam of Highflyer, was the daughter of Blank and granddaughter of Regulus; yet both Blank and Regulus were sons of Godolphin. Fox was born under similar conditions of relationship. The dam of Goldfinder was the daughter of Blank and granddaughter of Regulus. The granddam of Brick-hunter was a daughter of Bald-Galloway, who was also the sire of Brick-hunter. The great granddam of Flying-Childers, one of the most famous race-horses, was a daughter of Spanker, while his dam was also the dam of the last. The sire of the Knight of St. George, a winner of the St. Leger, was also his grandsire and great-grandsire. Smith, in his work on breeding for the turf, gives 'once in and once out' as the rule for breeding; but 'twice in and once out,' says Mr. Walsh, is more in accordance with the practice of our most successful breeders. The breeder can have no hesitation, continues Mr. Walsh, in coming to the conclusion that in-and-in breeding carried out once or twice is not only not a bad practice, but is likely to be attended with good results. The evidence of repeated success in resorting to the practice of in-and-in breeding is too strong to be gainsaid. 'For the race-course,' says Dr. Elam, 'the pure south-eastern breed is adhered to; but different *stocks* of the same breed, and those brought up in different localities, are

selected.' However, by 'crosses' breeders by no means understand the introduction of fresh blood. There are scarcely two thoroughbred horses in the stud-book, says Mr. Walsh, that cannot be traced back to the same stock in one or more lines. An absolute freedom from relationship is not to be found, or, if so, very rarely. Yet continued in-and-in breeding in the closest relationship he does not think advisable—it is apt to develop weak points in the constitution. 'The cautious breeder, therefore, will do well to avoid running this risk, and will strive to obtain what he wants without having recourse to the practice; though, at the same time, he will make up his mind that it is unwise to sacrifice a single point with this view.' Mr. Darwin says that statistics show that nearly one third of our race-horses have proved barren, or have slipped their foals—a fact which he ascribes to their high nurture and close interbreeding. This is very probably the case, since a racing-horse or mare, however delicate it may be, is too valuable not to breed from. Indeed, it is generally a disabled animal—one that has gone lame, and is therefore deprived of exercise and, with this, much of its natural health—which is set apart for breeding. Nor are they chosen for their fertility, but solely for their running powers. In-and-in breeding in horses is carried on at any rate to a very great extent, and with decidedly beneficial effects on the race.

"'Nimrod' concludes a comparison between the thoroughbred and half-bred hunter in these words: 'As for his powers of endurance under equal sufferings, they doubtless would exceed those of the "cocktail;" and being by his nature what is termed a better doer in the stable, he is sooner at his work again than the other. Indeed, there is scarcely a limit to the work of full-bred hunters of good form, constitution, and temper.' Napoleon's celebrated state horses were directly derived, says M. Huzard, from the Arab blood of Count Huniady, who had bred continually from the same two stallions. Indeed, it is the natural state of horses to breed in-and-in."

IN-AND-IN BREEDING OF DEER.

In many of the British deer-parks the deer have been allowed to breed uncrossed for long periods, without any degeneration showing itself or loss of general health. The dark herds of deer in the Forest of Dean, in High Meadow Woods, and in the New Forest, supposed to have been brought by James I. from Norway, have never been known to mingle with the pale-colored herds, although kept together with them—another case showing the rarity of crosses when animals are left to themselves. Dr. Davy mentions the case of a pair of red deer, who, about the year 1850, were taken from the herd and put into a paddock of twenty or thirty acres adjoining Stornoway Castle, Isle of Lewis; these have multiplied yearly, and numbered, ten years after, twenty-three, not including several which were killed, all descendants of the original pair, and all very much improved in comparison with the deer of the forest. Nevertheless, it is the practice, says Mr. Darwin, to infuse new

blood into the fallow deer of the British parks, and this, he says, proves of the greatest benefit in removing the taint of *rickback* and improving their size and appearance. Rickbacked deer are too generally found in many parks, says Mr. Shirley, supposed to be due to weakness, brought on both by breeding in-and-in too much, and also by insufficient food. In other words, we may say that the cause is unknown. The Scotch deer, however, breed naturally in-and-in, and the red deer generally breed between brother and sister for generation after generation, and yet they are, as a rule, perfectly healthy.

IN-AND-IN BREEDING OF FOWLS.

"Sir J. Sebright asserts that his fowls got long in the legs, small in body, and bad breeders from too close in-and-in breeding. Mr. Clark continued to breed in-and-in from his own kind of fighting cocks till they became under the weight required for the best prizes, and lost their pluck. On one cross from Mr. Leighton's they again resumed their former courage and weight. This breeder found that breeding from father and daughter produced a greater loss of weight in the offspring than breeding from the mother and son. Mr. Eyton, of that ilk, says his Dorkings became smaller and less prolific if not occasionally crossed. Mr. Hewitt says the same of Malays, as to size at least. But the fanciers with large stocks can breed from their own stock without this danger, because they keep various families separate for crossing purposes. Mr. Ballance, who breeds in this way, says that breeding in-and-in does not necessarily cause deterioration, 'but all depends upon how this is managed. My plan has been to keep five or six distinct runs, . . . and select the best birds from each run for crossing. I thus secure sufficient crossing to prevent deterioration.'"

Mr. J. S. Rogers, of Paterson, New Jersey, had some Dorking fowls that were inbred for many generations, until they became very diminutive in size. He at once concluded that if any animal could be diminished in size by in-and-in breeding, the converse must be true—they could be bred up in size; and selecting some eggs from a single hen of the large white Brahma breed, he bred in-and-in, always selecting the largest fowls from the descendants of the same hen, but taking care to have several runs of them. He brought them to an exaggerated size, the hens weighing twelve pounds and the cocks as high as fifteen pounds each. This is a good illustration of inbreeding, contrasting neglect and haphazard work with that of careful selection. The key-note of all successful breeding is *intelligent selection*. This, combined with a knowledge of the best formulas for inbreeding, enables the true breeder to accomplish great results in fixing the types of his own selection.

THE "DOWNY FOWLS."

The following instructive lesson was furnished for this work by Mr. J. V. Henry Nott, of Kingston, New York: "When I purchased my farm there were a

number of common fowls upon it of no particular breed. We got a number of Plymouth Rock cocks to improve them. After the second year, or when the flock were two thirds Plymouth Rock in blood, we noticed a chicken that looked like a ball of down; and while the rest changed to feathers, she remained downy, and so grew up to henhood, when she proved to be a remarkable mother and layer, raising three broods of chickens in the season, and beginning to lay before the chickens were weaned. So we concluded, as she was a curiosity in appearance, to save her sons and breed them to her, *though none of them were downy.* After three broods one of the chicks turned out downy, and a cock, which we bred to his mother, and their chickens were about half downy and shortwinged, while the rest were common, or feathered.

"We then took the downys, and kept a pair in two separate yards, and when they had chickens took a cock from one yard and pullet from the other, which was breeding cousins [full brother and sister.—Ed.] together, and that is what we are still doing, each generation being a degree of cousinship apart. We are now down to the sixth generation, and the chickens come all downy, but not all shortwinged, or without flight feathers, which is, of course, their great value, though their down is as valuable as goose-down, as far as it goes. But the fact of not being able to fly over a common board fence three feet high makes them the fowl for village people, and to fully establish that improvement we put each new generation in an enclosure with a fence but three feet in height, and keep only those to breed from that cannot get over, without regard to size or appearance.

"Their color is a dark smoky blue, and they are as large and hardy as the Plymouth Rock. Some have single and some double combs."

IN-AND-IN BREEDING OF JERSEY CATTLE.

The Island of Jersey, being but a small tract and isolated from the rest of the world, while its cattle are protected from all foreign contamination, would naturally become a field for the practice of inbreeding cattle. Such inbreeding as has been practised, however, has been mostly accidental and haphazard; yet the pedigrees of imported stock for the past five years show that nearly all meritorious animals trace in several lines to one bull—"Old Noble." Romulus bred to his granddam Musique produced the bull Cetewayo, whose progeny are remarkable for strong constitutions.

Gilderoy, tracing by two or more lines to "Old Noble," was bred to Regina 2d, a granddaughter and great-great-granddaughter of "Old Noble," producing Chrome Skin, a cow that made twenty pounds, thirteen ounces of butter in seven days. Gilderoy bred to Chrome Skin, his daughter, produced Gilderoy 3d, a bull noted for beauty and vigor. This is the breeding practised by Dr. Howe, of Bristol, R. I. There have been many fine illustrations of inbreeding among American bred Jerseys, some by the design of skilful breeders, others that were merely circumstantial. The

best model of a Jersey cow ever known—Jersey Belle of Scituate 7828—was produced by breeding Victor 3550 to his own daughter. Victor 3550 was the result of mating full brother and sister. Mr. Simpson's Alphea family has a number of very choice animals, produced by mating full brother and sister, and breeding the progeny to his daughters, granddaughters, and great-granddaughters in double lines.

Young Mercury, whose portrait is shown in this work, and whose escutcheon is used for the illustration on that subject, is the grandson of his sire Mercury and the full brother in blood of his dam Phædra, that made nineteen pounds, thirteen ounces of butter in seven days. Through seven lines he traces to Saturn and Rhea, the sire and dam of the famous cow Alphea. His formula is: Full brother to full sister and their son to his daughters and granddaughters of the same pure Alphea blood. Another noted family, originated by Mr. O. S. Hubbell, of Connecticut, is descended from the noted inbred bull St. Helier. The formula of this family is: sire to daughter, also to granddaughter, and then combine brother and sister; or the grandson of his sire St. Helier is bred to his half sister by St. Helier, and their male progeny is bred to a daughter or granddaughter of St. Helier with most successful results in the production of a choice type of butter Jerseys, that are also remarkable for their uniformity of style and quality. In England Philip Dauncey bred for forty years by coupling half brother and sister and using an occasional outcross from the Island of Jersey. "Pope," Mr. Dauncey's first bull, was purchased in 1826 from Mr. Michael Fowler, by whom another Island bull, "Fowler," was obtained thirty years later. From the combined blood of these two bulls descended the famous bull Rioter 2d 469, imported to America by Col. R. M. Hoe, and also "Stoke Pogis," a bull whose descendants in America have made a great name, the most noted cow being "Mary Anne of St. Lambert," that in her fifth year made eight hundred and sixty-seven pounds, eleven and three quarter ounces of butter, and has an official seven-day test of thirty-six pounds, twelve and one quarter ounces. All the best cows illustrate the success of inbreeding as an essential method of improvement.

INBREEDING AND FECUNDITY.

"Scraps for Breeders," in the London *Live Stock Journal*, contains the following:

"There is probably no opinion more generally accepted among breeders, and taken for granted in every new discussion, than that in-and-in breeding must induce barrenness. That there are grounds for this opinion is certain, for no conclusion obtains wide assent unless it be at least plausible—*i.e.*, consistent with ordinary observation. Yet the first thought, to one reader at least, on turning over the new volume of the 'Shorthorn Herd Book,' was, 'What a lot of twins there are by Booth bulls!' There are not now existing in the kingdom any cattle reared from closer affinities

than those at Warlaby; yet at Warlaby there was in 1883 one pair of twins and a triple birth: at Killerby there was one pair of twins; at Mr. St. John Ackers' two pairs; at Lord Polwarth's one pair; another pair at Mr. Talbot Crosbie's; another pair at Mr. R. Welsted's; while at the Duke of Northumberland's, Mr. Willis's of Carperby, and at Mr. T. Pear's—whose herds, although not of Booth origin, are very closely allied, by recent sires, to that strain of blood—there were in each case no less than three pairs of twins in one season.

"These incidents go far to show that, under proper superintendence, Shorthorns may yet be very closely bred for concentration of blood, and still remain fecund; and also that the ordinary allegation against Booth cattle, 'that they are slow breeders,' is not one which is necessarily true. For in the lot of cows and heifers of which these herds are composed, and which probably altogether do not much exceed two hundred and fifty animals, no less than seventeen, or nearly seven per cent., produced more than one at a birth in 1883. This rate of increase is above that of unpedigreed, loosely-bred dairies."

It would seem very plausible that the quality of producing twins might be made a prepotent and permanent trait in any breed, by careful and persistent selection, though perhaps it would not be so desirable in a dairy race as in beef breeds. The lack of fecundity in Shorthorns, or any breed, may be induced by allowing individuals of either sex to be kept in a state of obesity that induces fatty degeneration. It is stated upon good authority that the bull Hubback, from whom the Shorthorn race was derived, early became impotent, because he was allowed to become very fat, and consequently his own progeny were very few in number. The quality of the Jersey breed is such that very little difficulty obtains from a lack of fecundity through fat.

INFLUENCES DETERMINING SEX.

"In the January number of the *Popular Science Monthly* (1885) there is a review, by Prof. W. K. Brooks, of an article on the laws which determine sex, published by Carl Düring in the *Jenaische Zeitschrift*.

"'Each species has acquired, through natural selection, the useful property in virtue of which any deviation from the average ratio between the sexes is corrected by an increased number of births of the deficient sex, or a decreased number of the sex which is in excess.'

"Notice the increased number of male colts as the number of mares put to a stallion increases.

"Again, notice the increased male births following a war that takes many men from their homes.

"'A favorable environment causes an excess of female births; an unfavorable environment an excess of male births.' The female is supposed by Prof. Brooks to be the conservative element in reproduction, and the male the element through

which new varieties are introduced. Hence, when circumstances unfavorable to the race occur, an increase of males takes place, in order that the race, by altering its habits or structure to some extent, may adapt itself more readily to its surroundings. Assuming a large number of births to be an evidence of favorable surroundings, it has been shown that, in prolific races, the number of females is in excess, and again, in any case, as the number of births increases the ratio of females increases. The birth rate of females is higher in cities than in the country. So much in regard to the human race in general. As regards the individual, Prof. C. M. Hollingsworth puts forth the hypothesis that 'it is a *relative* preponderance of the conditions on which cell division depends which causes the formation of the female or male generative organs and determines the sex of the individual.' The higher plants, he has shown, have female flowers situated in places most favorable for cell growth, and male on places for cell division. The relatively larger plants are female. The sex of a plant can be influenced by placing it in a position favorable or unfavorable for cell growth. It is a fact, arrived at by experiment, that in the higher animals an early impregnation of the ovum results in the birth of a female offspring. It is supposed that in early impregnation an interval elapses before segmentation takes place, and in that time the male element tends to become 'assimilated,' and so, 'by hypothesis, to have its specific capacity or function of exciting cell division to some extent weakened.' In a late impregnation the reverse would occur, and a male offspring be the result."

Many Jersey breeders have made more or less persistent efforts to reduce to practice the theories of biologists in regard to control of sex in offspring. Insufficient data are obtainable upon which to suggest any plan of action or experiment with any reasonable assurance of success.

The Stuyvesant theory of alternating sex in successive periods of heat secured by observing the sex of the last birth, upon the hypothesis that the female gives for each period an ovum of alternating sex, has received some practical attention. Thus far the sexes have been about equally proportioned, the females but slightly preponderating; and this is doubtless a fixed law of the Creator for the preservation of both sex and species. If the law has been discovered or is discoverable, the knowledge of its application will be of immense advantage to all breeders of cattle.

THE RANKIN THEORY.*

"If we take the proper advantage of the fact that the cow has two ovaries, one of which throws off, in her normal condition, an ovum every twenty-one days, which may be impregnated and produce another of her kind, male or female, as is the ovum impregnated. Should a bull calf be the result of the last effort, then the

* G. T. Rankin, Jersey Bulletin, Sept. 23, 1885.

first ovum passed would be a female, if impregnated, which is the 'Stuyvesant theory.' But what I wish to impress upon the breeder is that in from nine to twelve days after the cow calves she will, through her ovarian system, deposit in the uterus an ovum susceptible of impregnation, although she will show none of the usual symptoms of being in a condition to be served; but if the last calf should have been a male, then a service within twelve days, if impregnation takes place we may expect a female as the product; but should she not prove pregnant, as the next ovum would be a male, we must pass the heat, if we want a heifer calf, and breed at what would be called the second observable heat, as the first will not be recognized by any objective signs from the cow, except by her actual exposure to the male. This is my improvement of the 'Stuyvesant theory' of breeding for sex; and as I have never seen the suggestion of the 'nine-day theory,' I claim it as original, and only ask breeders to report their experience if they think it worthy of trial. No doubt many breeders have tried the 'alternate heat theory,' and been disgusted as well as myself; but I would like if they would try again, *observing the nine-day caution.*"

The author of this work is not yet satisfied that we have any clew to the law controlling sex, but believes the subject worthy of persistent investigation and thorough systematic experimentation. Possibly physiological research by vivisection, by spaying one ovary, and like experiments, may some time lead to decisive results, which will give us the key of the great secret.

THEORY OF AGE OF THE OVULE.

Still another theory relates to the age of the ovule in determining sex. It has been promulgated and partially investigated by practice, that vitalization of the ovule by the male in the early stage of ovulation, or during the first symptoms of desire on the part of the female, that the resulting offspring will be a female, and conversely if several hours' delay before union of the sexes the ovule undergoes such changes that vitalization by the male then results in a male offspring. It would be well to collect as many observations as possible upon the above theories, singly and in combination. To that end it is commendable in breeders to keep an extended record of all cases in their herds from this time forward, so as to prove or disprove theories.

INFLUENCE OF SEX UPON OFFSPRING.

That the male transmits his peculiarities to the female progeny and the dam yields her characteristics to the male progeny is continually confirmed in nature.

A fine illustration of this axiomatic proposition is given by a correspondent of the *London Field*:

"I put a black-red game cockerel with willow legs to two white game pullets

with yellow legs and bills. I have thirty chickens of this parentage. Every cockerel has the shape and yellow legs of the mother, every pullet the type and willow legs of the father. Knowledge of this tendency is capable of rendering good service in many departments thought more highly of than chicken-breeding. Indeed, there is hardly any limit to its usefulness."

SUMMARY OF FACTS ON BREEDING.

1. That man was for twenty-five hundred years under a social system of the closest consanguinity in marriage, the era of the greatest longevity of the human race.

2. That mongrels of the human races, as the Mestizo and the Mulatto, are especially inharmonious mixtures in mind and body, notorious for their depravity and savage-like atavism.

3. "That the effects of crosses in man, animals, and plants are, first, *variability*, which depends, according to Darwin, 'on the reproductive organs being injuriously affected by changed conditions;' and, secondly, on *reversion*, which is generally a change for the worse, as the organism thus reverts to its former unimproved state, and the good effects of natural or artificial selection are thus lost."

4. That in a state of nature, horses, cattle, sheep, deer, elephants, bison, wild boar, and many other animals habitually practise in-and-in breeding, and also selection, the strongest male leading the herd by right of conquest.

5. That among our domesticated animals improvement is made by selection and the closest in-and-in breeding.

6. That fixity of type can only be maintained by perpetual in-and-in breeding.

7. That the qualities of a "sport" or phenomenal animal can only be preserved and perpetuated by close in-and-in breeding.

8. That perfect specimens of any species or breed can be perpetually inbred without any detriment.

9. That no physiologist has ever shown that disease or deformity can be attributable to in-and-in breeding as a cause.

10. That where disastrous results follow the practice of in-and-in breeding, the animals are diseased, and those diseases, like other peculiarities, may be intensified by inbreeding.

11. That a common difficulty is the condition of obesity, which results in sterility and fatty degeneration to those bulls or cows thus kept and overfed.

12. That swine and fowls and all other animals kept for their fat are in an abnormal condition, and consequently difficult to inbreed. Hubback, the bull that founded the Shorthorn breed, early became impotent from fat.

13. That the Jersey race of cattle, being less liable to fatty degeneration than most other races of domestic animals, bears in-and-in breeding well, and such

in-and-in breeding has been the means of developing the most wonderful specimens of productive dairy cows ever known in the world's history.

PLUS INTO PLUS, OR THE TRUE ART OF BREEDING.

> "There is a history . . .
> The which observed, a man may prophesy,
> With a near aim, of the main chance of things
> As yet to come to life ; which in their seeds
> And weak beginnings lie intreasured."—*Shakespeare.*

To all persons who read this book and are desirous of excelling as Jersey breeders, whether they are novices or have had many years' experience, the following directions may be found feasible and practicable for the progressive improvement of their herds.

1. As the bull is the breed, and contributes fully fifty per cent. of the blood value to each of his progeny, he should be the best animal obtainable.

2. The bull should be as largely of the strain, or family, as practicable, from which one wishes to breed.

3. Select the family you wish to breed, and from that family the best bull you can obtain.

4. Select your bull by the new scale of points, from a tested cow.

5. If you cannot find the bull that meets your requirements, have one bred to order, using in the interim of his development the best one that you can obtain.

6. A good bull is one of a thousand ; indeed, you might examine several thousand, and not find a suitable model for your herd.

7. I would designate the bull which possesses all the requirements sought as a *plus* animal ; for if he is properly bred he is likely to be very prepotent, and will transmit to his progeny more than fifty per cent. of blood value ; and in estimating his value he may be marked in the pedigree as (.50+) fifty per cent., *plus*.

8. Similars with similars is the great law for the breeder. St. Helier with St. Helier ; Albert with Albert ; plus with plus ; yellow skin with yellow skin ; butter breeder with butter breeder ; first order escutcheon with first order escutcheon, leaving no element of perfection out of the plan.

9. The bull must not only have an unbroken line of good ancestry for at least six generations without one inferior animal, no weak link in the long chain, but his dam should be extraordinary in all points ; the bull inherits his special qualities from his dam.

10. The cow that fulfils the requirements of the new scale of points may be called a *plus cow*, and is expected, if she be in-and-in bred, to transmit fifty per cent. of her blood value to her progeny. The *plus* cow inherits her special qualities from her sire.

11. To breed a *plus* bull, he should be the product of a formula that would make him the grandson or great-grandson of his dam, and she a twenty-five-pound cow, that he may inherit and intensify her form and character.

12. The *plus* bull should be bred to *plus* cows of the same family as himself. I think a good herd should be so uniform in blood ratios that all should be kept up to a fifty per cent. standard of the family blood. In some cases it would be better to make the animals one hundred per cent. by close in-and-in breeding, for it has been demonstrated that a line of family quality cannot be maintained without purity of blood. If the blood is let loose by crossing it may take years to recover it, or it may be irretrievably lost by such experiments.

13. All animals that fall below the breeder's own standard should be eliminated from the herd.

14. A *plus* cow should be the product of a formula that would make her the granddaughter or great-granddaughter of her sire, and he the son of a twenty-five-pound cow.

15. A good formula for the breeder and worthy of adoption as a motto is the algebraic rule of multiplication.

Plus into *plus* produces *plus*.

Plus into *minus* produces *minus*.

Minus into *plus* produces *minus*.

Minus into *minus* produces *plus*.

The last *plus* is a bad kind for the Jersey breeder to propagate.

16. One cannot be too particular in the breeding of his bull. He must be equally particular as to the cows he breeds.

17. Let the outcrosses, if you make any, not be absolute, but rather let them have at least fifty per cent. of the best blood which characterizes your herd, and the other element should be something that promises to supply a deficiency.

NEGLECTED OPPORTUNITIES.

How many neglected opportunities for doing grand work the history of Jersey breeding sets forth! Look at the portrait of Jersey Belle of Scituate 7828, and conjecture what such a cow would be worth to-day in the hands of a skilful breeder. Study her by the scale of points, her history, and her wonderful record upon moderate feeding. Where shall we see her like again? Where, oh, where were our geniuses—our Collings and Bakewells, our Prices or our Guenons—that they did not see to it that such a wonder of perfection should have been so bred as to leave her form and quality a rich legacy to the Jersey breeders of America, in at least one in-and-in bred *plus* bull that should more than replace her own individuality? Suppose she had been bred to Albert 44 or St. Helier 45, and inbred to her own progeny after the following formula:

HYPOTHETICAL PEDIGREE.

				St. Helier 45. A Plus Bull.
			St. Helier's Son.... .....— A Plus Bull.	
		St. Helier's Grandson . .— A Plus Bull.		Jersey Belle of Scituate 7828. A Plus Cow.
	Jersey Belle's Son and Great-grandson........— A Plus Bull.		Jersey Belle of Scituate 7828.	
PLUS BULL. —		Jersey Belle of Scituate 7828.		
	Jersey Belle of Scituate 7828.			

Does any one doubt whether there would have been a "nick" in such a formula? Let him try the experiment with as good a bull as St. Helier and as good a cow as Jersey Belle of Scituate!

Other Jersey bulls as worthy to have their names in such a formula were Albert 44, Landseer 331, Mercury 432, Signal 1170, Top Sawyer 1404, Gilderoy 2107, and Stoke Pogis 3d 2238. Victor 3550, the sire and grandsire of Jersey Belle of Scituate, was certainly worthy of filling such a formula; and if it could have been accomplished, what Jerseys we would now possess for founding herds of superlative excellence!

"BRIARCLIFF FARM."

PROPERTY OF JAMES STILLMAN,

SING SING, N. Y.

PART SECOND.

DAIRY FARMING AND MANAGEMENT OF STOCK.

"And he gave it for his opinion, 'That whoever could make two ears of corn or two blades of grass to grow upon a spot of ground where only one grew before, would deserve better of mankind and do more essential service to his country than the whole race of politicians put together.'"—*Swift.*

THE successful Jersey breeder must have a theoretical and also thoroughly practical knowledge of all the principles and requisites of dairy farming.

THE NINE POINTS OF GOOD FARMING.

1. The right selection of soil and location.
2. The right selection of animals, seeds, and plants.
3. The right construction of buildings, machinery, and tools.
4. The right underdrainage.
5. The right making and saving of manure.
6. The right modes of tillage.
7. The suitable rotation of crops.
8. The timely performance of work.
9. The requisite irrigation of all crops.

Volumes have been written upon each of the above-named subjects, and still they prove to be inexhaustible in interest and their importance immeasurable. When the Jersey breeder shall have mastered them all he will have lived long enough to become famous. All Jersey breeders who have good farms are very fortunate. In the selection of a farm for dairy purposes, one must first seek for fertility; buy a farm that is of the richest soil, or soil that can be made rich; secondly, it must be in a healthful region; thirdly, near enough, but not too near, to the best of neighbors; and fourthly, contiguous to a good market.

The farm should be stocked with the best strain of Jersey cattle and have buildings constructed suitable to their use. The crops grown must be the best assortment for the comfort and health of the occupants of the farm, and afford a sufficient variety of economical and wholesome food for all the stock. Every slough, swamp, or unprofitable acre of wet land must be thoroughly underdrained in the best manner

by the use of the best quality of glazed pipe and collar drain tile, thus improving the fertility and healthfulness of the farm.

The farm should continually grow richer by the saving and properly utilizing all the manurial elements, and by turning under green crops to make vegetable mould. The tillage should be done with the most effective and labor-saving implements and always thoroughly and appropriately qualified according to the needs of each crop and the condition of the soil. Tillage enables plants to digest and assimilate manures, as a thorough mastication prepares food for the animal economy. The crops must be so arranged in order of rotation as to utilize the various elements of cumulative fertility and allow of a restoration of those that are deficient or exhausted. If work is always done at the right day and hour much needless expenditure of vital force and money will be saved, and the farm will become like a well-regulated workshop, where every employé knows his place and fulfils the expectations of his employer.

It needs a good deal of careful planning to keep the machinery in smooth running order. To drain at the right time; to manure at the right time, in the right way; to plow at the right time; to pulverize thoroughly at the right time; to cultivate and harrow and till at the right time and all times; to plant at the right time; to reap at the right time; to turn on the water from the brook, fountain, or reservoir just at the right time, and save a crop from the drouth or a pasture from scorching; to raise big crops and keep down weeds at the right time—to do everything in the easiest and most expeditious manner and make it pay in money returns, is the province of good farming.

THE SOIL.*

BY DR. AUGUST VOELCKER.

"On examining the various soils of this or any other country, they will be found to consist generally:

"1. Of larger or smaller stones, gravel or sand.

"2. Of a more friable, lighter mass, crumbling to powder when squeezed between the fingers, and rendering water muddy.

"3. Of vegetable and animal remains (organic matter).

"On further examination of the several portions obtained by means of washings, we find:

"1. That the sand, gravel, and fragments of stones vary according to the nature of the rocks from which they are derived. Quartz-sand, in one case, will be observed as the predominating constituent; in another this portion of the soil consists principally of a calcareous sand; and, in a third, a simple inspection will enable us to recognize fragments of granite, feldspar, mica, and other minerals.

* Morton's Encyclopædia of Agriculture.

"2. In the impalpable powder, the chemist will readily distinguish principally fine clay, free silica, free alumina, more or less oxide of iron, lime, magnesia, potash, soda, traces of manganese, and phosphoric, sulphuric, and carbonic acids, with more or less organic matter.

"3. The watery solution of the soil, evaporated to dryness, leaves behind an inconsiderable residue, generally colored brown by organic matters, which may be driven off by heat. In the combustible or organic portion of this residue the presence of ammonia, of humic, ulmic, crenic and apocrenic acids (substances known under the more familiar names of soluble humus), and frequently traces of nitric acid, will be readily detected. In the incombustible portion, potash, soda, lime, magnesia, phosphoric, sulphuric and silicic acid, chlorine, and occasionally oxide of iron and manganese, are present.

"All cultivated soils present a great similarity in composition: they all contain the above chemical constituents. This similarity becomes still more apparent after burning, when nearly all soils will assume a red color, which is due to the presence of the oxide of iron.

"At first sight this might be regarded as opposed to the great diversity of soils; but if we examine the relative proportions in which the several constituents are mixed together, the state of combination in which they occur, and the manner in which the different soils are formed, we shall find that diversity is compatible with a certain similarity in elementary composition.

"In all fertile and arable soils organic matters, more or less decomposed, varying in quantity from one half of one per cent. to twelve per cent., occur; and as in good garden mould the proportion of such organic matters frequently amounts to twenty-four per cent. of its own weight, and seldom is less than ten to twelve per cent., it was believed that the amount of organic matters in soils determined their relative degree of fertility. This, however, is a great mistake, for there are soils containing only two per cent. of organic substances which are, notwithstanding, greatly superior to others containing six or eight per cent.; and, again, in peaty or boggy soils, belonging to the worst description, sixty or seventy per cent. are by no means uncommon. In soils celebrated as good wheat soils we have found not more than three to three and one half per cent. of organic matter; while in far less productive land we have found as much as ten to twelve per cent. That no reliance can be placed on the amount of organic matter in soils, as indicating their productive powers, is also clearly seen in the following determinations made by Dr. Anderson, in some of the best wheat soils from different parts of Scotland.

Locality.	Organic Matter in Soil.	Organic Matter in Subsoil.
Mid Lothian Wheat Soil	10.19	4.83
East Lothian Wheat Soil	6.32	5.85
Perthshire Wheat Soil	8.55	6.82
Morayshire Wheat Soil	4.54	3.76
Morayshire (different specimen)	3.47	
Berwickshire Wheat Soil	6.67	

"The organic matter in the soil is due, for the greater part, to the vegetable remains of former crops, and partly to animal matters, derived from the decay of insects or the excrementitious substances contained in manure. The vegetable and animal remains, under the influence of water, air, and heat, gradually decay, producing a brownish or black powdery substance, or rather a mixture of substances, which is known to practical men under the name of humus, or vegetable mould. There are principally two kinds of humus—brown and black; the former is contained in large quantities in the brown variety of peat; the latter, the result of further decomposition of the brown, is found in black peat.

"Brown and black humus have a very complex composition, which is changing every day as the decay of the vegetable remains in them proceeds. During this decay a number of peculiar organic acids are formed, as, for instance, ulmic, humic, crenic, apocrenic, and geic acids. These acids resemble each other very much in their general aspect, as well as in their composition. Humus plays an important part in the process of the nutrition of plants, but its functions cannot be explained by one action only, for it is evidently subservient to the luxuriant growth of plants in more than one way.

"Thus it exercises a beneficial action in condensing ammonia, as well as moisture, from the atmosphere, and likewise by furnishing a continual source of carbonic acid, arising from its decomposition. Again, the vegetable remains in humus always contain a certain amount of inorganic matters, but the latter are not soluble in the fresh roots, stems, and other parts of plants, and only become available to vegetation during their gradual decay and conversion into humus.

"Notwithstanding a general similarity in the composition of arable soils, the appearance and general character of many soils, in every country, present striking differences, which cannot fail to strike the attention of every superficial observer.

"The forms and proportions in which the chemical elements usually constituting soils are mixed together, in different localities, explain, in some measure, though by no means fully, the various appearances and agricultural capabilities which they

possess. These forms and proportions themselves depend on the causes and circumstances under which they originated.

"The manner in which some soils are formed will not be long doubted by any one who has observed the appearance of large rocky masses, the clefts and crevices they present, the bare surface of their smoother and harder parts, the growth of mosses and smaller plants on the more softened portions, the accumulations of gravel, smaller fragments of minerals, and fine mud, with their luxuriant vegetation at the foot of these rocks, and in the valleys of mountainous districts.

"These soils evidently have originated in the degradation and decomposition of the solid rocks in their immediate neighborhood, especially of those which occupy the surrounding eminences. But as rocks differ much in composition, the soils which are formed on their decomposition must necessarily present, in many cases, great differences equally with the rocks themselves; and the study of the latter will therefore be of considerable interest to the cultivator of the soil. In other instances, however, the nature of the soils, in a given locality, partakes nothing of the characters of the rocks in the immediate neighborhood, nor even of those on which they rest. The causes which are instrumental in the formation of soils fully explain this apparent anomaly; and we shall, for this reason, draw attention to the various causes which give rise to the formation of arable soils. In some instances we can trace the changes rocks undergo in the course of time, step by step, and refer them to their true causes; in others only the ultimate products of decomposition are well described, and their primary causes less clearly understood. This much is sure, that the causes which operate in the formation of soils are various and often complicated. Some of them may be referred to chemical forces and agencies; others, which are based on purely mechanical principles, we shall distinguish as mechanical causes; and a few partake of the nature of both—they act partly chemically, partly mechanically.

"I. Chemical causes of the degradation and disintegration of rocks.

"1. One of the principal agencies in effecting a gradual disintegration of solid rocks is the atmospheric oxygen. In the course of the formation of oxides the compact texture of the rock is broken up, and the whole mass of the rock gradually crumbles down.

"2. A second and no less powerful chemical agency in the formation of soils is the carbonic acid of the atmosphere, carried down by the rain. The affinity of carbonic acid for different mineral compounds varies greatly. Limestones are easily attacked by rain-water, while pure quartz and sandstones are scarcely acted upon by rain-water.

"Under the influence of carbonic acid and water, feldspar, granite, and other minerals consisting of silicate of alumina and an alkaline silicate are decomposed into alkaline silicates, which in turn give rise to silica and carbonate of potash or soda, and into silicate of alumina or pure clay.

"3. In the formation of soils from solid rocks the lower orders of plants and animals take an active share. The seeds of lichens and mosses floating in the air attach themselves to the roughened and partially decomposed surfaces of rocks, and finding here sufficient food, germinate and throw out roots, which penetrate the little crevices in the rocks like wedges. These widening and multiplying crevices hasten the final disintegration of the rock. Mosses and lichens likewise retain the atmospheric water and keep the surface of the rock moist for a longer time, giving in this manner rain-water a better chance of exercising its dissolving powers on the constituents of the rocks. Insects and other animals of the lower orders collect and feed on the lichens and mosses, and both insects and plants in due time die, decay, and leave all the mineral matter which they have originally obtained from the rock behind, mixed with vegetable and animal remains or humus. A thin layer of a more fertile soil is thus formed, on which plants of a higher order may spring up; in the course of time these die, and enrich and increase the soil.

"II. Mechanical causes acting on the formation of soils.

"Generally the first stage in the disintegration of rocks can be referred to a chemical force. The described chemical agencies, however, are often associated with mechanical ones, or followed by purely mechanical causes, which produce great changes in the appearance of rocks, and contribute much to the rapid formation and the peculiarity of some soils.

"1. One purely mechanical agency is the force of gravitation. When the force of gravity preponderates over cohesion, the rock so influenced contributes to fill up the valley below with disintegrated fragments. According to the nature of the rock, vegetation springs up on these débris more or less luxuriantly, often very rapidly.

"2. The finer portions of broken rocks are easily moved by the winds.

"3. Water exercises a powerful influence in changing rocks in a mechanical way.

"By freezing it expands and bursts the rock. The rains continually wash off particles and carry them to lower levels.

"The finer deposits form the alluvial soils of our river-banks. The vast mass of materials deposited at the mouths of large rivers alters the condition of the soils along the banks of the deltas from a naturally sterile into a most rich and fertile one.

"4. The sea likewise plays an active part in changing the character of the land near the shore and in giving rise to new soils.

"5. Vegetable remains, and especially animal remains, contribute much to the formation of some soils. Vast numbers of infusoriæ, near the mouths of rivers where salt and fresh waters mingle, die daily, mix with the mud, and are deposited along the banks, and thus alluvial soils of the utmost degree of fertility are formed.

CLASSES OF SOILS.

"Soils in general consist of a mechanical mixture of the following four ingredients:

"1. Silica, silicious sand, and gravel.

"2. Clay.

"3. Lime.

"4. Animal and vegetable remains (humus).

"There are few soils which consist of only one or two of these four substances; most contain them all, but the relative proportion of each in different soils varies considerably.

"A simple classification of soils, accordingly, may be founded on the preponderance of one of these four chief constituents:

"Soils may be conveniently classified as follows:

"1. *Sandy soils*, containing above eighty per cent. of silicious sand.

"2. *Calcareous soils*, containing above twenty per cent. of lime.

"3. *Clay soils*, containing above fifty per cent. of clay.

"4. *Vegetable moulds* (humus soils), containing more than six per cent. of organic matters or humus.

"5. *Marly soils*, or soils in which the proportion of lime is more than five, but does not exceed twenty per cent. of the whole weight of the dry soil, and that of clay is more than twenty, but less than fifty per cent.

"6. *Loamy soils*, or soils in which the proportion of clay likewise varies from twenty to fifty per cent., but which at the same time contain less than five per cent. of lime.

CHARACTERISTICS OF SOILS.

"1. *Sandy Soils.*—They are generally of a loose, friable, open, dry character, and for that reason are more easily and less expensively cultivated than any other description of soils.

"Many consist almost entirely of silicious sand and gravel, with but little alumina and calcareous matters. Such soils are almost absolutely barren, and in general termed *hungry* soils, from their tendency to absorb manures without any corresponding benefit to the land. Others contain a large proportion of alumina and lime, which render them more compact and always more fertile.

"On these richer kinds of sandy soils, beans, peas, and spring wheat succeed well; and as turnips are frequently grown with advantage on them, they are called also turnip soils.

"Sandy soils are capable of improvement.

"Clay, marl, chalk, and many other substances counteract the loose texture and porosity, and may with advantage be applied to them.

"2. *Calcareous Soils.*—As the physical characters of calcareous soils depend chiefly on the relative proportions of lime and the other constituents which enter into the composition of this class of soils, it is impossible to give a short general characteristic. While some are deep, dry, loose, and friable in their nature, and as productive as some soils resting on the lower chalk formation, others are stony, poor thin soils, producing but a scanty vegetation. Beans, peas, and clover are grown with advantage on this class of soils.

"They are subdivided into calcareous clays, loams, and sands, according to the proportion of clay and silica.

"3. *Clay Soils.*—The properties of clay soils are diametrically opposed to those of sandy soils. Stiffness, impenetrability, great power of absorbing and retaining moisture, and great adhesiveness characterize this class of soils. They are consequently cold, stiff soils, which are expensive and difficult to cultivate. When properly cultivated some are turned into highly fertile soils. Their mechanical structure may be corrected by drainage, burning, bulky manures, and the addition of lime, ashes, and sand.

"4. *Vegetable Moulds.*—Any soil containing more than six per cent. of organic matter, whatever else its composition may be, is called a vegetable mould. Soils of the most opposite physical characters may be thus grouped in this class. They are clayey, loamy, or sandy. Many are highly fertile; others are more or less unproductive, but capable of improvement; and others again contain so large a preponderance of organic matter that they are called *peaty* or *boggy*.

"5. *Marly Soils.*—Marly soils resemble more or less in their characters calcareous and clay soils.

"They are always less retentive, less impervious than clay soils, but generally not so open and porous as many calcareous soils. On the whole, marly soils belong to the better, more productive, and generous soils.

"A sandy marl is a marly soil in which a large proportion of clay is replaced by silicious sand. Clay marl, on the contrary, is a marly soil in which clay preponderates.

"6. *Loamy Soils.*—The term loam is reservéd to all soils which contain the four chief constituents—silicious sand, clay, lime, and vegetable and animal remains—in a fine state of subdivision, intimate mixture, and in such relative proportions that the quantity of lime does not exceed five per cent. nor that of clay fifty per cent.

"Loamy soils, next to the richer garden moulds, belong to the very best soils. They are easily cultivated, and yield abundant crops of almost any kind. Many alluvial deposits that are celebrated for fertility belong to this class.

"Sandy loam, clay loam, marly loam, are terms applied to soils wherein sand, clay, or marl appear more prominently than in others."

Analysis of Loamy Soils.

BY DR. ANDERSON.

Constituents.	Soil.	Subsoil.
Silica	63.19+	61.63+
Alumina	14.04+	14.24+
Organic Matter	8.55+	6.82+
Peroxide of Iron	4.87+	6.23+
Potash	2.80+	2.17+
Water	2.70	4.57
Soda	1.43	1.04
Lime	0.83	1.27
Phosphoric Acid	0.24	0.26
Sulphuric Acid	0.09	0.03
Carbonic Acid	0.05	....
Chlorine	0.009	0.02
	100.00	100.00

"It is a natural inference to expect in unproductive or barren soils a deficiency or total absence of one or more of those constituents which are highly conducive to the luxuriant growth of plants. A chemical examination in such cases must prove of utility to the practical man, inasmuch as it not only is calculated to point out the cause of infertility, but also to suggest an efficient means to raise its productive powers. In many other cases, in the majority of instances, the barrenness cannot be traced to the deficiency or total absence of an important soil-constituent nor to the existence in the soil of a substance injurious to vegetation. The fault may be one, not of the existence, but of the accessibility of the requisite ingredients for the crop. All the substances needed by the plant may be present, and in sufficient quantity; the soil, considered as a storehouse, may be full; and the infertility complained of may simply be the want of the key.

"This is the case of a soil locked up in stagnant water, which only needs drainage to prove the fertility which one would expect from its analysis. But independently of this, as a general rule, even a minute chemical analysis, in which only the proportions of the several constituents are indicated, is of comparatively little, and often of no practical utility to the individual who has had a reproductive soil analyzed, with the view to have a remedy suggested by the analytical data for bringing it into a better state of cultivation. . . .

"A point of great practical importance is the state of division in which the constituent parts of soils are mixed together; and as a chemical analysis gives no

information in this respect, the necessity for submitting the soil to a mechanical examination becomes apparent.

"Such an examination enables us to ascertain whether its mechanical condition is such as to render its cultivation economical or expensive, and at the same time llows us to recognize the nature of the stones which are found in the soil. An acquaintance with the composition of the stones affords a good criterion as to its probable state of productiveness, and in many cases suggests the propriety of leaving the stones on the land or of removing them.

"The property of absorbing water, either in the form of vapor or in the state of dew from the atmosphere, has a material influence upon the productive characters of soils, and contributes to explain the superiority of one soil over another. Intimately connected with the preceding property is the power of soils absorbing fertilizing gases from the atmosphere. Generally speaking, those soils which absorb a larger amount of moisture from the air than others are also the better absorbers for carbonic acid and ammonia.

"This property, though dependent in a great measure on the porosity or the state of division of the various constituent parts of the soil, is still more intimately connected with its chemical constitution."

RIGHT SEEDS, PLANTS, AND ANIMALS.

Under this second point of good farming might be arranged the discussion of the raising and improvement in quality of all kinds of seeds and all the grasses and clovers and the root crops used upon dairy farms. But the scope of this work will hardly admit of such an extended discussion. It is well, however, to advise that, as far as practicable, farmers raise their own, and patronize those dealers only who have a reputation for careful selection as to purity and quality of all kinds of seed.

In regard to the selection of stock for the dairy farm, no one who has taken pains to inform himself in regard to the merits of the various races could hesitate to give his choice to the Jersey as pre-eminently the best of all breeds of dairy cattle.

QUANTITY OF SEED REQUIRED TO PLANT AN ACRE.

Barley, in drills	1	bushel.
Barley, broadcast	2½	bushels.
Beet, in drills 2½ feet	9	pounds.
Cabbage, sown in frames	4	ounces.
Carrot, in drills 2½ feet	4	pounds.
Clover, Lucerne (Alfalfa)	10	"
Clover, Alsike	6	"
Clover, Large Red	16	"
Clover, Large Red, with Timothy	10	"

Corn, Sweet	10 quarts.
Corn, Field	8 "
Grass, Timothy, with Large Red Clover	8 "
Grass, Orchard	64 "
Grass, Italian Rye	20 "
Grass, Mixed (twenty varieties with Clover)	40 "
Mangold, in drills 2½ feet	9 pounds.
Millet, broadcast	50 "
Oats, in drills	¾ bushel.
Oats, broadcast	1½ bushels.
Parsnip, in drills 2½ feet	5 pounds.
Peas, in drills	2 bushels.
Rye, in drills	1 bushel.
Rye, broadcast	1½ bushels.
Turnips, in drills 2 feet	3 pounds.
Wheat, in drills (*best conditions*)	¾ bushel.
Wheat, broadcast	1½ bushels.

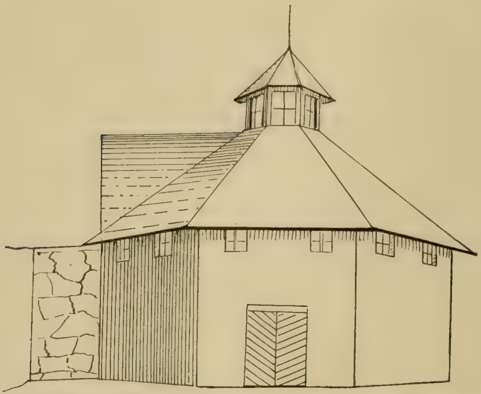
THE BARN.

The barn is a storehouse for fodder, and should never be used for a stable. The contamination of sweet hay, grain, and roots by the putrescible exhalations and vapors of a stable is neither conducive to the health of the animals nor compatible with the highest excellence of quality for the butter and cream.

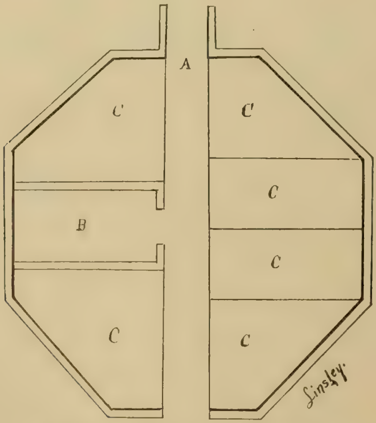
In a barn that costs $1000 a man can keep $50,000 worth of Jerseys; but if from any cause the building takes fire, he is sure to lose his herd. The risk is too great.

The most economical form of barn is the octagon. A fifty-foot octagon, suitable for a fifty-acre farm and a storage of fodder sufficient for fifty head of Jerseys, can be built at a cost of about $700. The barn may be of lumber, but preferably a concrete wall, with a lumber framed roof covered with slate. The walls may be twelve to eighteen inches thick and twenty-four to twenty-eight feet high; the rafters thirty-four feet long; the roof lighted by a cupola. If the barn can be located in a side-hill of sufficient height, a bridge or an earth driveway can be constructed so as to drive in at a gable door and dump all loads from a floor resting on the top of the walls, thus saving a vast amount of labor in unloading hay, grain, and roots. Where this plan is impracticable, the next best thing for hay is the horse-fork, which has a free swing in such a barn, there being no cross-ties or beams to obstruct its working.

The walls should be made of water-lime cement, sand, gravel, and small fragments of broken stone.



ELEVATION FOR OCTAGON BARN, WITH SIDE-HILL DRIVEWAY AND GABLE ENTRANCE.



GROUND PLAN OF OCTAGON BARN.

A, Driveway. *B*, Root Cellar. *C*, *C*, *C*, Compartments for Hay and Corn Stover.

Upper story may be used for storing grain crops.

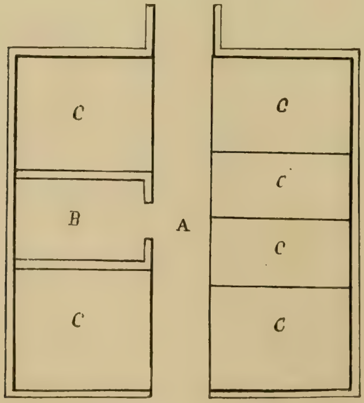
FORMULA FOR CONCRETE.

Sharp sand, 4 parts; water-lime, 1 part. *Mix thoroughly before wetting.* MIX VERY WET; add gravel, 4 parts; MIX VERY WET, and work over thoroughly four times. Add small broken stone, 4 parts.

Put into the box or form a layer of an inch of the mortar and then a layer of stone, always taking care to have the stone in the centre and a layer of mortar making fully two inches of the outer portion of the wall. The mortar should be tamped in, so as to make it solid. Let it dry forty-eight hours for each tier of one foot in height. If care is observed the building will be better in quality than stone or brick, as it makes a very dry wall. Sills placed on the top of such a concrete wall are liable to rot from being coated with lime. This can be prevented by spreading a layer of gas-tar or asphalt on the top of the wall. No moisture should be allowed to come in contact with a concrete wall until it has become hard; then it will be water-tight. There should be a drain cut lower than the foundation wall to carry off any water that might come against it from the hill-side. Fill in the space above the drain, which should be of good pipe, with small stone as high as the bank in which the excavation is made.

The boxes or forms for a wall one foot thick should be made of plank fourteen inches wide, one and a half inches thick, and of the right length. The standards or posts may be three by four scantling a little exceeding the height of the wall. These posts are set fifteen inches apart, with the planks on the inside. The standards are held in place by nailing thin pieces of board across. These remain in the wall. The planks on the outer side of the octagon must of course be longer than the inner by the thickness of the wall. The boxes need a clamp to prevent their springing between the standards, and it is well to have the plank lined with tin or zinc to prevent their becoming flexible from the excess of moisture while the wall is drying. The clamps may be made of hard wood two feet long, with a two-inch hole at each end, and fifteen inches apart. A strong pin two feet long is set in each hole so as to protrude ten inches, and these pins will just fit over the outside of the plank box, and a brace driven between the upper ends will make them clasp the box. Two or more of these are needed for each form. Door and window frames have jambs the width of the wall's thickness, and must be put in place at the proper time and plumbed the same as the standards. The usual cost of the concrete wall is about ten cents a cubic foot. It will be a little more when the walls are high. Walls twenty-four feet high give a capacity of hay storage eighty per cent. greater than when but sixteen feet, because of the closer packing of the deeper mow. The floor of such a barn may be of concrete and laid directly upon the earth. The root bins should be walled in with concrete partitions on the hill-side of the basement. The grain bins are to be placed in the attic. From these the grain is drawn down through a cloth spout into bags or barrels, as needed.

ELEVATION FOR SIDE-HILL BARN, WITH DRIVEWAY ENTERING AT GABLE.



GROUND PLAN OF BARN.

A, Driveway. *B*, Root Cellar. *C, C, C,* Compartments for Hay and Corn Stover.
Upper story used for grain crops.

The corn crib, for storing maize in the ear, is best made of slats with spreading top, and set upon posts capped with flaring tin pans as a guard against rats.

THE STABLE.

The STABLE is the most important of farm buildings, and needs as much care and forethought in planning as the dwelling-house of the owner. The stable is the home of the Jerseys, and should be devoted solely to their comfort and health. Neither horses, sheep, swine, fowls, nor dogs should be allowed to occupy the same building with Jerseys. The reasons for such exclusiveness should be obvious to every butter-maker, as the object of the true breeder is not only to develop the Jerseys to the highest perfection, but to produce the best quality of dairy products.

The requisites for a Jersey stable are: (1) a fire-proof building of the parallel form, built of material that shall render it cool in summer and warm in winter, and free from dampness or frost on the floor and wall; (2) to afford a full supply of sunlight; (3) perfect ventilation; (4) convenient facilities for feeding and watering; (5) comfortable stalls and fastenings; (6) the best means of cleanliness; (7) the manure storage to be conducted in a separate structure.

THE BUILDING.

As far as walls are needed for a stable, water-lime concrete, made according to the formula for the barn, is the best material. Such a wall has a peculiar porosity of an infinite number of very minute air cells, which render it almost the equivalent of a double wall of brick or stone as a non-conductor of heat and moisture. The wall must be so built as to have a stratum of the concrete mortar on the external and internal surfaces of about two inches thickness, and the centre of the wall a stratum of broken stone mixed with the water-lime cement and mortar, the whole to be thoroughly tamped and well dried in each successive tier of building. The roof should be of slate. The stable needs a dry floor. This should be made of concrete. First, a film of coal-tar upon the levelled hard earth; second, a layer of soft mortar and gravel, which, after drying forty-eight hours, may be topped with a layer of several inches (four to six) of small fragments of broken stone; third, a layer of gravel or sand which must be thoroughly rolled and worked into the stones; fourth, a layer of concrete mortar three inches deep, well tamped and left forty-eight hours to dry. The ground must first be marked out according to the plan of the stable, making excavations for the water troughs in front of the cattle and the manure gutters behind the platforms.

As the cattle may be allowed to drink frequently, the gutter beneath the manger need be but shallow—five or six inches deep—with fall sufficient to empty when plug is removed at the lower end. The manure gutters are to be cleaned three times

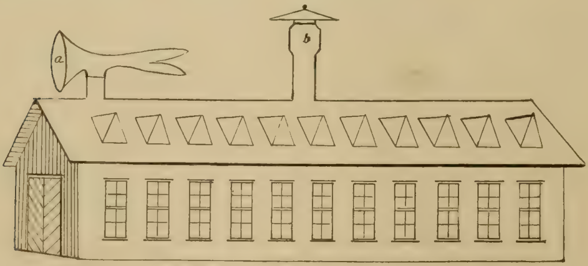
daily, and may be thirty inches wide by six inches deep, with sufficient fall to discharge the urine. This will be treated of under "Cleanliness."

SUNLIGHT.

The direction of the building, if from north to south, is best, as the windows then receive the early rays of the sun; those who prefer the noonday sun can have an east and west plan; but any arrangement whereby a large amount of sunshine may fall upon the cattle is desirable, and that which provides most is best. One large window for each animal, or at the least for every two animals, is a plan to be commended—windows that come within a foot of the floor and the same distance from the top of a ten-foot wall. The windows should also be double, with an air-space of six to eight inches between, thus saving warmth in winter and rendering the stable cool in summer. But the sunlight is as needful to the thrift of animals as it is to plant life, and the breeder who gives his cattle sun baths in winter will soon learn its vitalizing effects.

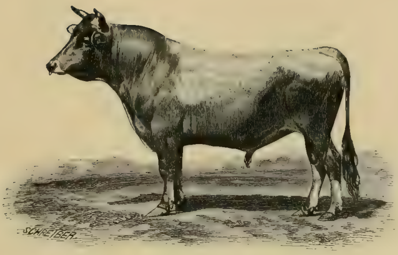
VENTILATION.

As in the human dwelling, so the stable should have a perfect system of ventilation; for cattle have the same lung diseases or a similar loss of vitality when deprived of oxygen as the human race. The air should not only be kept as near a state of purity as possible, but as far as practicable at a healthful temperature. Cattle thrive well and make their best growth at a temperature of about 60° Fahrenheit. "A fight with flies and poverty" at 90° or with foul air and poverty at 10° below zero may suit the fancy of some theorists who hold that "roughing it" is the correct system of disciplining cattle into endurance; but humane treatment only will be found profitable with Jerseys or any other breed of cattle.



STABLE.

a, Air-Receiver. *b*, Ventilator.



THALMA 4288.

St. Helier Type.

OAKLANDS HERD.

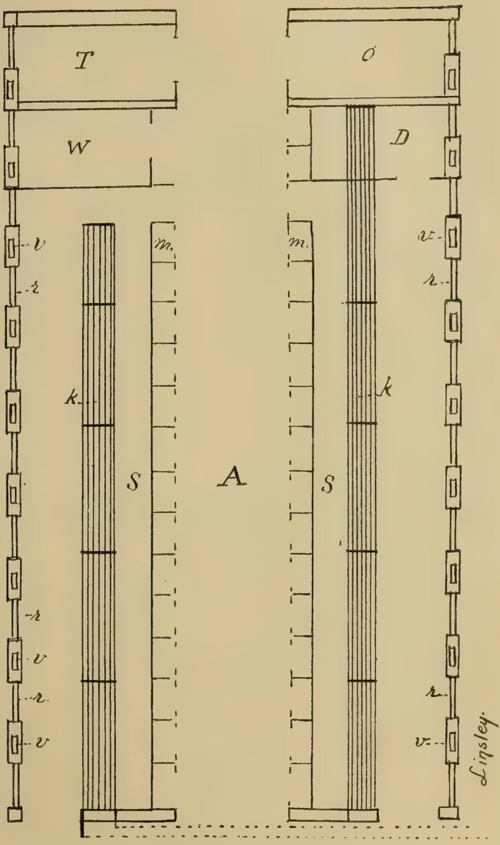
VALANCEY E. FULLER, HAMILTON, ONTARIO, CANADA.

TAOMA 7200.

St. Helier Type.

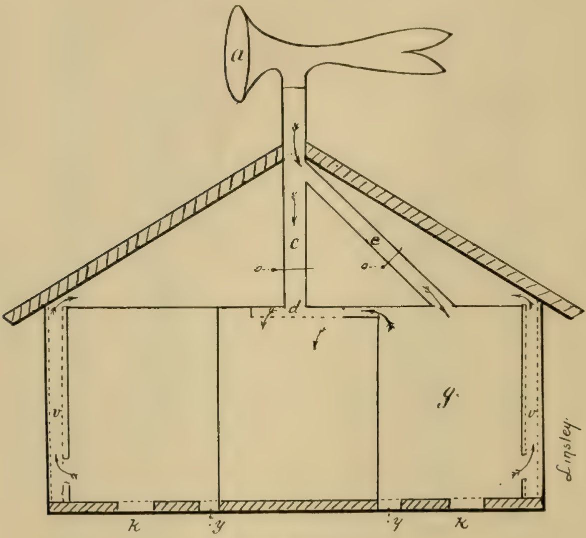
BRIARCLIFF HERD.

James Stillman, Sing Sing, N. Y.



GROUND PLAN OF STABLE.

T, Tempering Room. *W*, Wash Room. *O*, Office.
D, Bull Stalls. *S*, Cow Stalls. *k*, Grating over Gutters.
A, Feeding-way between cattle which may have railway-track for feeding-car.
m, Mangers. *v*, Ventilating Flues. *r*, Windows.



SYSTEM OF VENTILATION.

a, Supply Funnel facing the wind.
c, Supply Pipe for Summer.
d, Air Box perforated at the bottom.
e, Winter Supply Pipe to Tempering Room.
g, Warm Air from Tempering Room.
v, Foul-air Exhaust Flues.
o, Dampers.
y, Channel for Drinking-Water.
k, Channel for Manure Gutter.

Buildings need means of ventilation other than windows or doors. Least of all can we count upon the natural ventilation resulting from the porosity of building materials. There should be ample provision made to furnish a supply of fresh cool air sufficient for comfort in the heat of August, or to keep up a constant and pure flow at 55° to 60° when the outside temperature is far below the freezing-point. We must provide for the removal of the exhalations of lungs and skin and the evaporated particles from dung and urine; for all putrescible matters that are dangerous sources of tubercular lung disease, or that in any way tend to lower animal vitality.

The fresh air is best introduced from above and in the faces of the animals. The exhaust or outward flow should always be from the base of the wall behind the

cattle. One large flue, with an opening a foot square, between each pair of windows will conduct the foul air into a ventilating loft in the attic. Large ventilators on the ridge disperse the current outwardly. The outflow may be enforced by heat or regulated by an air-tight blower. The thermometer is essential to show the temperature of the stable, and the plan should be to pass a river of pure air perpetually through the stable as near the temperature of 65° as it is practicable to produce. The pure air must not be shut out because of pinching cold, but some artificial means of heat must temper the air before it is introduced. During the severe winter weather the most convenient method of tempering would be the "ventilating stove," which combines all the elements of stove, furnace, and open fireplace. Where a steam-engine is used the heat may be utilized. The subterranean system of the deep earth duct may be found of great advantage in some large herds. By referring to plate the elements of ventilation are illustrated. The air is best introduced by a long duct at the top of the stable between the two rows of cattle. This duct may be of pine smoothly planed within or of galvanized iron, the bottom of the duct to be closely perforated with half-inch holes. Such a system will not only prevent tubercular disease, but insure normal health and full constitutional vigor.

THE WATER SUPPLY.

Very fortunate is the farmer who can turn the water of a pure spring from the hillside into his dwelling and stable. Cows require more water than any other stock. They drink enormous quantities when in a full flow of milk. The experiments of Prof. Horsfall and of M. Dancel illustrate the necessity of an abundant supply. The former "found that cows, when giving only twenty pounds of milk per day, drank forty pounds of water more than fattening cattle of the same weight." The latter says that "by inducing cows to drink more water, the quantity of milk yielded by them can be increased many quarts, without injuring the quality." By moistening their fodder and adding a little salt the milk was increased from nine and twelve quarts on dry fodder to twelve and fourteen quarts daily. The amount a cow drinks is a criterion of her milking powers, a cow that drinks fifty quarts of water daily giving eighteen to twenty-three quarts of milk. The water should be pure and about 65° in winter and summer. It should run through a gutter in front of the stalls. The gutter is to be covered by a hinged lid, which forms the floor of the manger, when closed. Some breeders prefer a trough which is raised or lowered like a dumb-waiter. Water should always be pure and perpetually supplied in the manger gutter, winter and summer.

CAPACITY OF TANKS AND CISTERNS.

Two feet in diameter and ten inches deep holds....................	19 gallons.
Three feet in diameter and ten inches deep holds....................	44 "

Four feet in diameter and ten inches deep holds	78	gallons.
Five feet in diameter and ten inches deep holds..................	122	"
Six feet in diameter and ten inches deep holds......................	176	"
Seven feet in diameter and ten inches deep holds..................	239	"
Eight feet in diameter and ten inches deep holds..................	313	"
Nine feet in diameter and ten inches deep holds..................	396	"
Ten feet in diameter and ten inches deep holds......................	489	"
Eleven feet in diameter and ten inches deep holds..................	592	"
Twelve feet in diameter and ten inches deep holds..................	705	"
Thirteen feet in diameter and ten inches deep holds................	827	"
Fourteen feet in diameter and ten inches deep holds................	959	"
Fifteen feet in diameter and ten inches deep holds................	1101	"
Twenty feet in diameter and ten inches deep holds................	1958	"

Repeat the quantity for each ten inches in depth.

A good cow requires from twelve to fifteen gallons of water daily.

A herd of fifty good Jerseys require seven hundred and fifty gallons daily.

A tank six feet in diameter and five feet deep holds ten hundred and fifty-six gallons—an ample supply for fifty cows, if it is kept filled or replenished each day.

THE STALLS.

It is desirable to have as little wood in the stable fittings as possible, and *no paint on any part of the interior of the stable.* The cattle stand in two rows, facing inward. The concrete floor, covered with suitable bedding, makes a good arrangement for a stable bottom. This floor must be level, from front to rear, and have the same slope and incline as the gutter. The gutter ought to be covered with an iron grating (Stewart's). The part of the stalls between the manger and gutter may be three feet six inches wide. The gutter may be from thirty to thirty-six inches wide. The grating consists of flat wrought-iron bars three eighths by one and one half inches, riveted to an iron frame, and hinged so as to be turned up when cleaning the stable. The cattle stand with the fore-feet on the bedding, and the hind-feet reach the first and second or third and fourth bars, so that all the dung and urine fall into the gutter. The space allowed for each cow should be about three feet six inches in width. A pavement of brick saturated with boiling asphalt is an excellent stable flooring.

CLEANLINESS IN THE STABLE.

A first-class breeding establishment should always be in a condition for visitors to see, especially in regard to cleanliness, which is essential to the health of the animals, the purity of dairy products, and the morality of the workmen. The stable should be cleaned regularly three or more times a day. The attempts to store

manure in a cellar beneath the stable or to deodorize it in a deep gutter are not commendable. The receptacle for the manure should be a separate building devoted to the collection of all the excrement from all the stables, cattle, horses, sheep, swine, and fowl houses; to the drainage of the dwelling, including the contents of the water-closets, washtubs, sinks, and the kitchen garbage. This manure factory may be a large concrete water-tight reservoir, roofed over to keep out rain and flies. This vat will require a great quantity of water from the roofs of buildings or a reservoir, and in winter if there is not rain enough snow must be applied, so that the contents may be kept in a condition of moderate fermentation, and it can be applied as needed to fields and crops by the manure-spreader. Some might make a step in advance and liquefy the whole mass, to be applied to the soil by a sprinkling cart or by irrigating pipes.

BEDDING.

All bedding should be short. Marsh grass, salt hay, straw, the refuse hay and corn stover from the mangers should be run through the cutter to a length of one or two inches. This may be used alone or mixed with "peat moss," and being kept clean by the Stewart grating, will last a long time, and make a comfortable bed. Cocoa matting has been used for bedding cows. The peat moss of commerce is excellent bedding.

THE FASTENINGS.

Some form of stanchion may be used if one wishes the advantage of cleanliness to be secured. There is a rotary stanchion, which promises to be just what is needed. Whether the best contrivance for fastening has yet been devised remains to be proven.

MANGERS.

The hinged lid over the water gutter forms, when closed, the floor of the manger. All the mangers require side partitions to keep each cow's mess isolated, but the front may be open. This renders feeding from a car convenient as it is moved through the stable, and the manger is conveniently kept clean by being brushed out daily.

CHEAP STABLING FOR COWS.

"Lay out, for twenty-five cows, a space one hundred feet long by fourteen feet wide. Set cedar or chestnut posts, six feet apart, nine feet high for the front, and seven feet high for the rear. Set a row of posts four feet high, four feet apart, and four feet from the rear row. Board up with twelve-foot hemlock boards laid horizontally all these three rows. Close in the ends. Put on rafters spiked to the posts, so that the roof boards will fit quite close to the plates. A 2×4 scantling

nailed to the top board and spiked to the posts will make a sufficient plate. Lay the roof boards of sixteen-foot hemlock from front to rear; the roof will have two feet slope. Cover the roof joints with three-inch strips well nailed.

"The roof boards rest upon three boards nailed to the rafters three and one half feet apart. If strong boards are selected the roof will be firm.

"Make a feed trough along the inside of the inner partition two and one half feet from the ground; leave out one board—the third; hinge this to the lower board and with cords, so as to make a falling door at an angle of forty-five degrees for a 'shoot' to the feed trough. Fasten the cow to the post by a strap, or use a stanchion. Give each cow five feet of space, and make a plank gutter fourteen inches wide, leaving three feet space behind. Make a concrete floor at a cost of fifty cents per cow. Cost of stable, $125."—*N. J. H.*, *New York Tribune.*

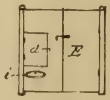
THE CALF STALLS.

In the plan for stable shown herewith the attic or second story is appropriated as the most suitable place for the keeping and rearing of calves.

A convenient arrangement is to have two rows of box stalls or pens, each stall four by eight feet, to be occupied by a single calf, as this prevents annoyance of sucking each other.

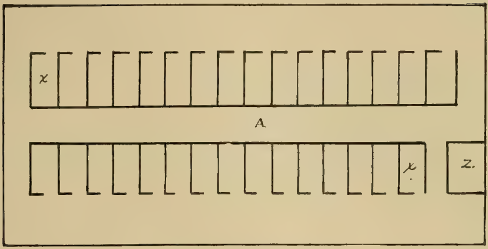
A passage-way between the rows of stalls serves for a cart to carry the milk for feeding. The stalls must be well lighted; indeed, a glass house would be the best for calves in this respect.

Upon the front of each stall, beneath a feeding door, fix a band of hoop iron of size and shape to hold the pail securely while the calf is drinking, or, better still, place the sucking feeder within the stall. When the milk has been warmed to the temperature of 102° by the thermometer, add the requisite quantity of prepared rennet, and set the pails into the receptacles in front of the stalls, and open the feeding doors. These doors may be nine by thirteen inches in size, and should swing so as to clear the top of the feeding pail. The calves readily learn to drink from a feeding pail thus placed, but one can use the sucking apparatus instead of the pail if he prefers that method.



FRONT OF CALF STALL.

E. Door. *d*. Feeding Door. *i*. Ring for Pail.



ATTIC-FLOOR CALF STABLE.

A, Passage-way. *x*, Stalls. *z*, Elevator.

SELECTION OF IMPLEMENTS.

An important element in the education of every farmer is the cultivation of the faculty for judging and selecting labor-saving tools and machines. Probably there is no department of agriculture upon which so much of the final success depends as the right selection and use of implements. When one instrument will do double the work of another of the same cost it is a matter of economy to know it and make it available. The farmer needs the best of everything, and always the peculiar implement suited to his own special circumstances.

The plow should have all the qualities of the best invention, the lightest draught, the best material, and also be specially suited to the quality of soil and the situation of the land.

The harrow should combine the qualities of pulverizer, smoother, and cultivator.

The drill should be adapted to all kinds of seed, and perfect in its mechanism.

Cultivators should be adjustable for smooth, shallow, surface pulverization, or for the needs of special crops.

LIST OF APPARATUS FOR A DAIRY FARM OF ONE HUNDRED ACRES.

One sulky plow.
One swivel plow.
One iron frame steel-tooth harrow; pulverizer, smoother, and cultivator.
One two-horse drill, with force-feed grass seeder.
One two-wheel cultivator, for root crops.
Six steel-prong hoes.
One twelve-foot poly-section roller.
One mowing machine.
One wheel horse rake.
One reaper and binder.

One hay tedder.
One thresher.
One fan mill.
One corn sheller.
One improved grinding mill.
One hay cutter.
One cutter and crusher for corn stover.
One root cutter (Clark's).
One bone mill.
One motor—two to four horse-power, with attachments suitable for all machines to be used.
One hay loader.
One power hay fork.
One dumping hay cart.
One hundred hay caps.
One root cart.
Three steel hay forks.
Three manure forks.
Three shovels.
One post-hole digger.
One power manure lifter.
One manure cart or spreader.
One sprinkling cart for liquid manure.

LIST OF APPARATUS FOR BUTTER DAIRY USING THE CREAM OF FIFTY COWS.

One three-can Stoddard creamery for testing cows.
One largest size dairy creamery, Stoddard.
Six Perfect Milk Pails.
One No. 1 Stoddard churn for testing cows.
One No. 6 Stoddard churn.
One centrifugal butter worker.
One lever butter worker.
Two fifty-gallon cream tempering vats.
One weighing scale.
One butter salting scale.
Two dairy pails.
One half-gallon dipper.
Two butter ladles.
Two dairy thermometers—eight-inch nickel.
One cream strainer.

One buttermilk strainer.

One self-gauging butter printer.

One butter tray

LIST OF APPARATUS FOR CHEESE DAIRY USING THE WHOLE MILK OF FIFTY COWS.

Six Perfect Milk Pails.

One two-hundred-gallon self-heating vat.

One eight-blade metallic-head curd knife, perpendicular.

One six-inch by twenty-inch curd knife, horizontal.

One curd scoop.

One curd pail.

One weighing scale.

One dairy thermometer.

One whey strainer.

One syphon.

One gallon dipper.

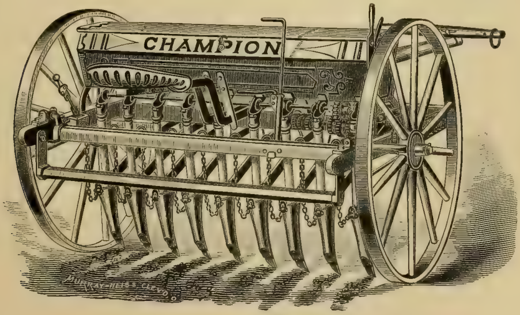
One curd mill, rotary disk with cutting blades.

Two moulding presses for ten three-pound cheeses.

Tin-foil for cheese wrappers.

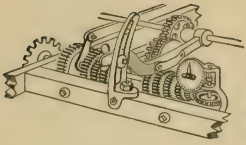
FARM IMPLEMENTS OF SPECIAL MERIT.

As an illustration of the points of excellence in farm implements, the author has deemed it expedient to show several inventions of special merit by the following series of cuts and a mention of their salient points of superiority and utility.



CHAMPION GRAIN AND FERTILIZER DRILL.*

* Gere, Truman, Platt & Co., Owego, N. Y.

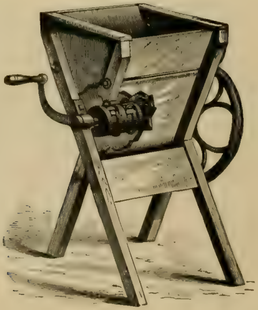


DEVICE FOR CHANGING FEED.

SPRING HOE.

Points of Excellence.

1. It has force-feed grain distributers.
2. It has force-feed grass-seed distributers.
3. It has force-feed fertilizer distributers.
4. You can sow grass seed equally well in front or behind the hoes.
5. It has a special device for dropping and fertilizing corn.
6. It has a cold-rolled steel axle, which has three times the strength of the iron axle.
7. It is well balanced and of light draught.
8. Its frame is braced with heavy castings at the four corners.
9. By a very simple device, change of feed is made by changing speed of distributers, but no loose or detached pinions are used.



CLARK'S ROOT CUTTER.

10. It is easily handled by the team and operator.

11. It can easily be set to sow accurately any desired quantity of grain, grass seed and fertilizers.

12. It is made of the best materials and the best workmanship.

CLARK'S ROOT CUTTER.*

(THREE SIZES.)

Description.

This cutter is built with a heavy oak frame, well bolted together; is stanch and strong, neatly finished and handsomely ornamented.

The cutting apparatus consists of a cylinder of steel knives, shaped like a chisel gouge, so arranged on a wrought-iron shaft that they are perfectly secure; no chance of becoming loose or breaking.

Operation.

It works with rapidity and ease, cutting the roots into thin, narrow pieces, which are thoroughly crushed and fitted for easy mastication by the animal. Nos. 1 and 2 are for hand use; No. 3 for power.

Points of Excellence.

It is compact and portable.

It is strong and durable.

It is effective and uniform in its work.

It is worked with ease, a boy cutting forty bushels, and the power cutter one hundred bushels an hour.

It facilitates mastication and digestion, and promotes health.

It precludes all danger from choking.

It will reduce apples, beets, carrots, mangolds, pumpkins, parsnips, and turnips to the proper condition for use.

It is an indispensable apparatus in every stable for economy of labor and the safety and health of the animals.

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* Manufactured for R. H. Allen Company, 189 and 191 Water Street, New York.

DAIRY IMPLEMENTS OF SPECIAL MERIT.

THE PERFECT MILK PAIL.*

Description.

The pail is made of the best tin plate, and will bear a weight of three hundred pounds; holds fourteen quarts; has a concave lid; a broad funnel upon the spout; a rubber tube renders the spout flexible, and there is a strainer at the lower end of the spout.

Points of Excellence.

It prevents the entrance of dirt or dandruff, and excludes foul air.

It forms an easy seat for the milker.

It enables the milker to do rapid work.

It strains the milk.

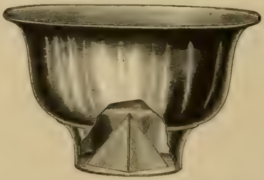
Its funnel is adjustable to low or high cows.

It can be used without the rubber tube.

It is very durable.

It secures clean milk, sweet cream, and better butter and cheese than can be obtained without it.

It is indispensable for comfort, cleanliness, and consummate quality of product in every dairy.



MORE'S PYRAMIDAL STRAINER.

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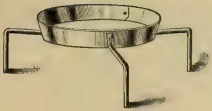
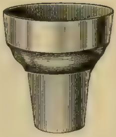
* R. H. Allen Company, 189 and 191 Water Street, New York, General Agents.



REST.



FUNNEL.

MORE'S PYRAMIDAL STRAINER.*

Points of Excellence.

It is durable, being stamped from heavy tin and retinned.

It cleans milk rapidly, and will not clog when regularly cleaned at using.

It gives a large straining surface.

It uses finer cloth than a flat strainer.

Its form allows the milk to fall on its apex, and the sediment settles at the base.

It is a perfect milk strainer, and can be used with the rest and funnel upon any sized pan or can.

THE STODDARD CREAMERY AND REFRIGERATOR,† WITH PATENT SKIMMING ATTACHMENT.
(ELEVEN SIZES.)

Points of Excellence.

The cream is drawn off the milk through an adjustable tube passing down through the milk and bottom of the can through the faucet. The milk is afterward drawn through the faucet.

No watching for cream line or cream flakes. No cream wasted.

There is no sediment drawn with the cream, as is the case when the milk is drawn from *under* the cream and the cream afterward drawn out or poured from the can. When the milk is drawn from *under* the cream the sediment is not drawn out with the milk, or but a small part of it, but runs out when the last of the contents of the can is discharged, which is the cream.

The skimming is done quicker than by any other method, which is a great advantage in the cream-gathering system.

Milk or cream can be drawn out at any time.

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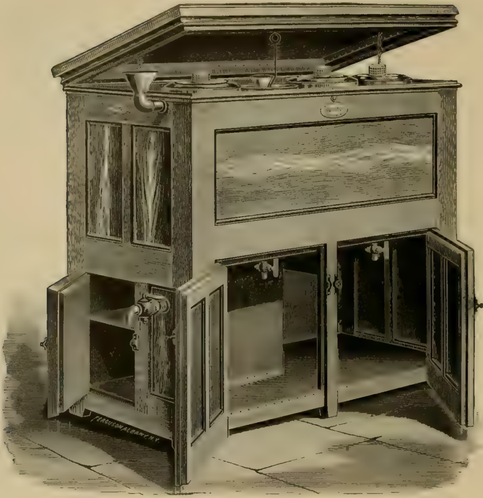
* Moseley & Stoddard Manufacturing Co., Poultney, Vt.

† Moseley & Stoddard Manufacturing Co., Poultney, Vt., or their agents.



THE STODDARD CREAMERY AND REFRIGERATOR, WITH PATENT SKIMMING ATTACHMENT.

Ventilation of milk, removing animal odors, and saving of ice.

All faucets are brass, nickel-plated, with ground joints.

Cans are easily removed if necessary for any purpose, and are interchangeable.

The construction of tank affords space for large pieces of ice.

It has a perfect refrigerator.

The walls of the creamery are thick and built refrigerator style; has lining of two thicknesses of heavy paper and *double air space*, thus effecting a great saving of ice.

No other creamery so thoroughly constructed in this respect.

It is made in two styles, with and without the separate refrigerator compartment. The refrigerator is built in one end of the creamery, is lined with zinc, and has slate shelves. It has no connection with the milk receptacle. The door to refrigerator is in the end of creamery. It is *dry* and *very cool* when ice is used for cooling the milk.

Can be used with running water at a temperature of 55° F.

It is an indispensable convenience for the purpose of testing butter cows.

It is the most economical in price, considering material, workmanship, convenience, and utility.

It is fully protected by letters patent.

THE STODDARD CHURN.*

Points of Excellence.

Its form gives thorough mixture of cream, with degree of concussion desired.

There are no dashers or floats to injure grain of butter.

Simple in construction and very durable.

It is especially adapted to the granular system of making butter; glass indicator shows when to stop the churn.

Being air-tight, it never leaks.

It is readily ventilated, allowing gas to escape.

Butter can be rinsed in the churn and thoroughly drained.

It can be used with any regulated motor.

It makes the best quality of butter.

It is an indispensable convenience in making butter tests of cows.

It is fully protected by letters patent.

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* Moseley & Stoddard Manufacturing Co., Poultney, Vt., or their agents.

DRAINAGE OF LAND.*

"There is no subject which of late years has attracted more attention or excited more discussion among those interested in the cultivation of the soil than the drainage of land. It requires no great research to discover the reasons for the interest which this subject has attracted to itself. Whether we look at the vast amount of capital annually expended on it or at the great improvement in the agriculture of the country which it is gradually effecting, we cannot fail to perceive it to be a subject of the greatest importance. Were any extraneous evidence of its importance required, it might be found in the recent vote of Parliament, by which the enormous sum of two millions sterling was set apart to be loaned out for its encouragement and extension; and in the avidity with which the whole of that large sum was applied for and absorbed in the course of a few months.

"Notwithstanding that the benefits to be derived from draining are now so well known and appreciated—so much so, indeed, that most agriculturists, if asked what they considered the first requisite toward good farming, would, without hesitation, answer, thorough drainage of the land—still, the careful observer, casting his eye over the surface of the United Kingdom, cannot fail to be struck with surprise at *the vast extent of available surface* which is rendered partially or absolutely valueless to the community by the presence of an excess of water.

"The great extent of land which is still undrained excites the more surprise when we reflect that experience has shown that even very unpromising portions yield large and remunerating returns for the outlay.

"The beneficial effects which result from complete drainage of land may be classed under two heads—mechanical and chemical. The mechanical division includes the improved efficiency of all those laborious operations carried on for the purpose of pulverizing and cleaning the soil, such as plowing, harrowing, and weeding. It also includes the saving in time and labor in carrying out the general business of the agriculturist, as well as the saving of that portion of seed which is destroyed in wet soil from mechanical causes.

"The chemical division is a copious one, and embraces more than our philosophy even dreamed of twenty years ago. It includes all that great class of phenomena relating to the improved fertilizing powers of manures and alteratives, as we may, in certain cases, denominate lime, marl, clay, etc.; the improvement of climate; the raising of the temperature of the soil; the acceleration of the period of the harvest; the decomposition of substances in the soil injurious to vegetation; the improvement in the nutritive value of herbage, and other crops; and, in consequence of all these, improved races of animals, including even man himself.

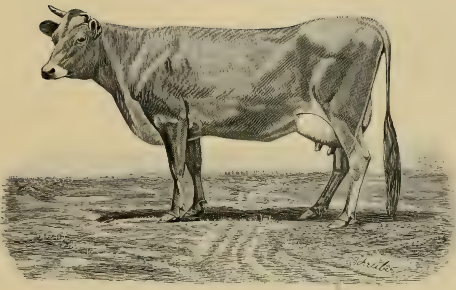
* Encyclopaedia of Agriculture, by J. C. Morton, Edinburgh. Extract from article by John Girdwood.

FOOTSTEP 5163.

Signal Type.

VERNA HERD.

FREDERIC BRONSON, SOUTHPORT, CONNECTICUT.



EVELINA OF VERNA 10,971.

AT 6 YEARS OLD.

Signal Type.

VERNA HERD.

FREDERIC BRONSON, SOUTHPORT, CONNECTICUT.

MECHANICAL ADVANTAGES.

"Let us first, then, consider the mechanical advantages. Every one at all acquainted with the conduct of agricultural operations must be aware of the great difficulties which a wet state of the soil throws in the way of performing these operations with propriety, despatch, or economy of labor. The great object of all the operations of tillage is, along with the removal of weeds, to reduce the soil to a finely divided state, through every part of which the fine filamentary roots of plants may spread themselves, in order to obtain supplies not only of moisture and air, but of those substances of which they are partly composed, and the due preparation of which is one of the most important functions of all mechanical operations of the soil.

"The tempering of mortar or clay affords a very apt simile for any operations undertaken on land in a wet state, and furnishes a very true analogy as to the results. It will, therefore, be evident that, so far from furthering the object in view, plowing, or other working of land when wet, will have the directly contrary effect of rendering it more stiff and close; and instead of producing a finely divided and porous state of the soil, so indispensable to the healthy and vigorous growth of crops, will leave it, when dry, a hardened mass, in which useful plants will find it difficult to obtain even the most scanty subsistence.

"In such a climate as that of Britain, where there is generally a great deal of rain and very little evaporation during the greater portion of the period in which the preparation of the soil must go on, and where wet, undrained land, once thoroughly moistened, hardly dries until the searching breezes of spring begin to act upon it, it is a matter of no small difficulty to find a season when operations may be carried on with propriety upon the land.

"In order to meet this difficulty, it is the custom on wet land farms to maintain an extra force, both of men and horses, in order to seize such favorable opportunities for working the land as may present themselves; to take advantage of a good 'tid,' as such an opportunity is sometimes called; and to complete, within a few weeks of early autumn and late spring, those operations which the cultivator of dry or drained land may carry on at his convenience during the greater part of winter. The latter is enabled to effect the tillage of his land in a careful manner at absolutely less cost than that for which it can be slurred over in the most imperfect way by his less fortunate or less improving neighbor, who, notwithstanding all the haste he can make, is frequently 'caught out,' and compelled to leave unsown, fields which have been prepared and manured, and to substitute, at a more propitious season, some less valuable crop for that which he intended.

"It is not in the operations of tillage alone that extra labor is demanded from men and horses on wet land; the carting on of manure, the carting off of produce—in fact, all operations whatever carried on upon its surface are alike impeded.

"The saving effected by drainage in the number of horses required on a farm has been variously computed by different authorities; but it seems to be a very reasonable calculation to estimate at one in four, or twenty-five per cent.; while even with the smaller number the preparation of the soil is effected in a more complete manner.

"The power of laying land flat with safety is one of the important advantages which draining confers.

"The narrow, high-backed ridge, which wet, undrained land requires, is but too often accompanied by a bare and sterile furrow, hardly replacing the seed bestowed upon it; whereas, after thorough drainage, by gradually levelling down the ridges, every part may be made to yield alike, and to present the appearance of a garden clothed with equal and uniform luxuriance.

"There are, perhaps, few occasions on which the value of efficient drainage addresses itself more powerfully to the mind of the farmer than at the season of the year when the preparation for the root crops goes on. Upon farms where large breadths of potatoes or turnips are grown, with what anxiety does the cultivator of undrained land watch every cloud! well knowing that a few days of rain may destroy the results of weeks of laborious exertion; and that on the very eve of commencing to ridge his fields the effects of the various plowings, harrowings, and rollings, which have cost him so much care and expense, may be annihilated. The turnip has with truth been called 'the root of good husbandry.' It may be likened to a miner; for it explores the soil, and brings up from it much valuable material, in a state fit to be converted into beef and mutton, while the refuse of that conversion forms food for new tribes of plants. Like a miner, however, it cannot work unless the mine be kept 'water-free.' It cannot be called 'the root of good husbandry' when it barely replaces the manure which may have been supplied to it. It is only when it yields fair crops that it is so; and in order to obtain these, the first requisite is to have the land freed from stagnant water.

"It is found that, coincident with drainage, an important alteration takes place in the texture of tenacious soils, by which their nature is so modified as to permit of the most perfect pulverization, without any very great expenditure of labor.

"If the extension and improvement of the cultivation of the manure-making crops were the only advantages of thorough draining, it might with truth be asserted that these would amply repay the country and individuals for the outlay; for without an abundance of root-crops there can be no very large manure heaps; and without the latter well-filled barnyards cannot be obtained.

"It is found, however, that *all* the cultivated crops are benefited by the drainage of the soil, in some cases to such an extent as to repay the outlay in a single crop.

"The advantages resulting to the grain crops are not confined to increased luxuriance and bulk. The ear is found to be better filled, and that with a weightier

and more valuable grain; the harvest, too, is generally found to be hastened, which is no unimportant consideration, especially in the later districts of the country.

"There are few cases in which the value of drainage is more strikingly illustrated than in the case of wet grass lands. The first effect of a judicious and thorough system of drainage on such lands is the speedy disappearance of rushes and the coarse subaquatic grasses, and the substitution of a rich sward of sweeter and more nutritious herbage, which not only maintains a larger number of animals, but maintains them in superior health and condition. There are no more effectual means for the extirpation of that most destructive disease, the rot in sheep, than removing the superfluous water in the soil. So efficient, indeed, has this been found, that on farms where rot annually destroyed large numbers of them not a single instance of the disease has occurred since the land has been drained.

"Paradoxical as it may appear to the inexperienced, the drainage of watered meadows, where the soil is retentive, is a most valuable and profitable improvement, and has, in many cases, at once doubled the crop both of hay and aftermath.

"Drainage has a most important effect in preventing land from burning in dry seasons and in preserving a certain degree of moisture in the soil. This arises wholly from the more perfect division of the soil which takes place after land is drained, and not from drains forming reservoirs of moisture, as some have asserted. Soil has the power of absorbing much moisture from the air; and this power, as might be expected, is increased in proportion to the surface exposed. This peculiar property of soils did not escape the notice of the illustrious Davy, who, in speaking of this subject, says: 'The power of the soil to absorb water, by cohesive attraction, depends in a great measure upon the state of division of its parts; the more divided they are the greater is their absorbing power.' And again: 'The power of the soils to absorb water from the air is much connected with fertility. When this power is great, the plant is supplied with moisture in dry seasons; and the effect of evaporation in the day is counteracted by the absorption of aqueous vapor from the atmosphere by the interior parts of the soil during the day, and by both the exterior and interior during the night. The stiff clays, approaching to pipe clays in their nature, which take up the greatest quantity of water, when it is poured upon them in a fluid form, are not the soils which absorb most moisture from the atmosphere in dry weather. They cake, and present only a small surface to the air; and the vegetation upon them is generally burnt up as readily as upon sands.' *

"There needs no apology for transcribing this passage from the great pioneer of scientific agriculture. It explains, in a clear and forcible manner, one of the most important advantages of the thorough comminution of the soil, which draining so greatly tends to promote. It will, no doubt, be eminently suggestive to the

* Elements of Agricultural Chemistry, by Sir Humphry Davy.

thoughtful agriculturist, and it will explain some apparent anomalies; among others, the reason that horse-hoe work among turnips, in a dry season, has very much the same effect as successive showers of rain.

"Liebig and others have shown that rain and snow generally contain substances in the highest degree useful to plants, and that soils have the power of abstracting these substances from the rain which passes through them. It has been further shown by chemists that various injurious substances are washed out of the soil where a perfect system of drainage is in operation, or are so changed in their nature as to become innocuous.

"Various experiments have shown that rain, when percolating through the soil, has a strong influence in raising the temperature of the latter. The causes of this will be readily understood when we reflect that rain, at those periods of the year when vegetation is in progress, generally possesses a temperature considerably above that of the soil. In passing through the soil each successive portion of the rain gives off part of its excess of heat, until a mean temperature is established. This may be termed a positive cause of increased temperature; but there is also a negative cause, tending to the same end, in the great decrease of evaporation from drained soils. A great amount of evaporation is constantly taking place from the surface of soil saturated with water, and the temperature of the soil is consequently lowered; whereas, when the amount of moisture does not greatly exceed that for which the soil has a natural affinity, but little evaporation takes place, and that portion of the solar heat which would be dissipated in evaporating this water is applied to raising the temperature of the soil itself.

"Mr. Parkes has detailed a set of very valuable experiments in this important branch of the philosophy of drainage, in which he compared the temperatures of drained and undrained portions of bog. He found the temperature of the undrained portion to remain steadily at 46°, at all depths, from one to thirty feet; and at seven inches from the surface the temperature remained at 47° during the experiments. During the same period the temperature of the drained portion was 48¼° at two feet seven inches below the surface; and at seven inches reached as high as 66° during a thunder-storm; while on a mean of thirty-five observations the temperature at the latter depth was 10° higher than at the same depth in the undrained portion of bog.*

"The sources from which excessive moisture in the soil is derived may be classified under two general heads: (1) *Springs* rising to the surface, and pouring out their waters over the adjacent land, or saturating the soil and subsoil at those points which they approach, without directly discharging on the surface. (2) *Rain* stagnating in the soil and subsoil. To these might be added such occasional and

* Parkes' Philosophy and Art of Land Drainage.

accidental sources as the overflowing of rivers and streams presents; but, as in such cases the water is generally carried off on the subsiding of the flood by open ditches and water-courses, that portion remaining in the soil may be considered in the same light as if derived from a heavy fall of rain.

SPRINGS.

"These owe their formation to certain peculiarities in the crust of the earth, by means of which rain falling on more elevated ground is collected and poured forth in a perennial discharge at a lower level, and frequently at very distant places.

"The crust of the earth is composed of numerous strata, or layers, lying one over the other, sometimes in a nearly horizontal position, but more frequently in one more or less inclined, or dipping, as it is termed, to the horizon. Some of these strata, such as gravel and sand, are highly porous and absorbent, and readily permit the passage of water; while others, such as clay and some rocks, are nearly or altogether impervious.

"When rain falls upon a tract of country part of it flows over the surface, and makes its escape by the numerous natural and artificial courses which may exist, while another portion is absorbed by the soil and the porous strata which lie under it. Again, rocks lying under the surface are sometimes so full of fissures that although they themselves are impervious to water, yet so completely do these fissures carry off the rain, that in some parts of the county of Durham they render the sinking of wells useless, and make it necessary for the farmers to drive their cattle many miles to water.

"It sometimes happens that these fissures penetrate to enormous depths, and are of great width, and filled with sand or clay.

"These are termed *faults* by miners, and some which we examined, at a distance of four hundred yards from the surface, were from five to fifteen yards in width.

"These faults, when of clay, are generally the cause of springs appearing at the surface; they arrest the progress of the water in some porous strata, and compel it to find an exit by passing to the surface between the clay and the faces of the ruptured strata. When the fault is of sand or gravel the opposite effect takes place, if it communicates with any porous stratum; and water which may have been flowing over the surface on reaching it is at once absorbed.

RAIN.

"This, as it is the most universal, so it is the most important source of an injurious excess of moisture in land. Before the introduction of thorough draining rain-water in excess was hardly looked upon as an evil with which the drainer could deal. Land was divided into two classes—wet and dry. No one contemplated the possibility of

converting all the wet lands into dry lands by artificial means; the attention of drainers was, therefore, attracted merely to the removal of springs. These rendered certain parts of most districts of country useless for agricultural purposes. They arrested the course of the plow, and thus demanded attention and remedy. We accordingly find that the early methodical applications of draining were mainly directed to the removal of spring water, to rendering the 'springy' and boggy ground equal to that among which it lay, and not to the amelioration of the whole body of the soil, as is now the case.

"The quantity of rain which falls varies most materially in the different latitudes of the world; thus, according to Humboldt, one hundred and forty-one inches annually fall in Cuba, while only twenty inches fall in Paris. The quantity of rain varies, too, very much in different localities of the same country.

"But in estimating the quantity of rain which requires to be provided for in draining operations, it is not merely necessary to take the average annual fall into account; provision must be made to meet the greatest fall which is likely to take place in a limited period. To carry the system which was required to accommodate a fall of fifty inches of rain annually to a part of the country where the fall was only twenty inches might fairly lay the drainer open to a charge of wastefulness.

"Pipes of an inch bore, and laid at wide intervals, have been highly recommended by several drainers of great experience, without any caution as to their application in wet localities; and yet our own experience convinces us that larger pipes, laid at little more than one half the distance recommended, are barely adequate to perform the work required of them in some districts of country.

"The whole of the rain which falls is not carried off by drainage, but a large proportion of it is carried into the atmosphere by evaporation. The experiments of Mr. Dickinson show that of the rain which fell rather more than one half was evaporated, leaving rather less than one half to be carried off by drainage.

DRAINS.

"The drains used may be divided into two classes—*open* and *covered*. These again may each be subdivided into drains intended merely to act as water-courses, and drains which, in addition to acting as water-courses, are also intended to carry off the surplus water from the land through which they pass.

OPEN DRAINS.

"The rudest forms of open drains are the deep furrows, lying between narrow, high-backed ridges, which are still to be found in some parts of the country, with their accompanying water-furrows for discharging their streams.

"These are only meant to carry off the surplus water after the soil is completely

saturated; and this they effect by carrying along with it all the best portions of the soil and of the manure which may have been spread upon its surface, as the turbid waters discharged from fields so treated abundantly testify. These require no other remark here than a recommendation to substitute for them some of the more perfect forms of drain to which we shall have to advert.

OPEN DRAIN WATER-COURSES.

"The ordinary ditch is the common form of this kind of drain, and though rude, it is one which cannot altogether be dispensed with, although where a perfect and complete system of drainage has been effected few indeed of them ought to be found. They are constant sources of annoyance, from their sides crumbling in; and they are constant sources of expense, not only by occupying much valuable space, but also by requiring a thorough annual scouring, wherever any pretensions to good farming are made. They are also fruitful nurseries of weeds. Open ditches occupy an important place in the early stages of draining bogs; but after the bog has become consolidated, the greater portion of them may be dispensed with, and their places supplied by large covered drains.

"In forming open drains in loose soil the sides should generally slope at an angle of 45°, which is the smallest angle at which earth, if it be at all crumbly, will retain its position; indeed, in deep cuttings, such as railways present, a fall of one in two, or a slope of $27\frac{1}{2}°$, is that which is generally preferred. Where the soil is excessively stiff, as strong clay, or where the sides of the drain are to be lined with masonry, or where the channel is cut in rock or marl, the slope may be less than 45°.

"The depth, dimensions, and direction of open water-courses must be determined by the purposes they are to serve. Sharp turns are to be avoided, more especially where the fall is rapid or the quantity of water is great; for the banks are generally hollowed out by the force of the current where such turns occur; and thus it may happen that at the very time when a free channel is of the utmost consequence in discharging some flood of rain, a stoppage or impediment may be created by the fall of a portion of the undermined bank. Where sudden and steep descents are required in the course of open drains, it is a good practice to line the sides with rough masonry, and to pave the bottom, so as to prevent that hollowing out which sometimes converts a moderate-sized ditch in a few years into a gully or ravine of formidable dimensions.

"Sometimes in large drainage works, where outfalls require to be formed for extensive districts, calculations of a complicated nature have to be made, to show the size of main drains which will be required to void the waters which may be expected to flow into them. Sir John Leslie has given the following rule for ascertaining

the velocity due to declivity and depth of current in streams: 'Multiply the mean hydraulic depth* of the river by the declivity per mile, both in feet, and extract the square root of the product; the result, diminished by one-sixteenth part, will be the mean velocity of the river in miles per hour.'

"Having thus found the velocity due to any proposed channel, the quantity of water which it can discharge will be found, in cubic feet, per minute, by multiplying the area of the transverse section of the stream by its mean velocity in feet per minute.

"Thus, a channel or water-course six feet wide and two feet deep, and having a fall of only five feet per mile, will discharge 2464 cubic feet, or 15,400 gallons per minute; and would, therefore, be capable of discharging a fall of two inches of rain in twenty-four hours from 488 acres of land, supposing the whole quantity to be carried off by it.

COVERED DRAINS.

"We now come to the consideration of the more important description of drainage—the removal of water by means of covered drains.

"For hand-made drains the tools consist of a set of spades—generally three of different sizes—gradually diminishing in width to suit the different parts of the drain.

"For soils free from stones these spades work better when curved; but for stony lands the flat form is preferable. For taking out the last narrow spit, to form the seat for the draining pipe, long narrow spades are used, called bottoming tools. There are also scoops of various widths, furnished with long handles, and rounded or flattened in the soles, according as they are required to finish the bottom of the drain, for the reception of stones, a horse-shoe tile and sole, or a draining pipe. In the formation of large and deep drains a shovel, very much bent at the neck, or having a great 'lift,' as it is termed, is very useful for finishing the bottom. Where the subsoil is stony or hard, a hand pick or foot pick is required to loosen it before it can be shovelled out.

"For the purpose of laying pipes in narrow deep drains, an instrument called a pipe-layer has been invented, and is indispensable; for the narrowness of the drains prevents a man from standing in them, nor is he able to reach the bottom with his hand, without much trouble; while, with the assistance of the pipe-layer, he does not require to go into the drain at all, and can proceed with great expedition.

"In addition to the tools named, a drain-gauge is a necessary instrument.

* The mean hydraulic depth is the depth which would obtain if a stream were made to flow in a new channel, the breadth of which was equal to the sum of its present mean breadth and twice its mean depth. Thus a stream having a mean breadth of six feet and a mean depth of two feet would give a mean hydraulic depth of 1⅕ feet.

Different sizes of these are required for the different widths and depths of drains. Where the fall of the ground to be drained is very slight, the workmen should be provided with a level. The best form of this instrument, because that which they most readily understand, is the ordinary mason's level, but made of large dimensions, and having a stem of such height as to show the 'bob' above the drain, when the level is applied at the bottom.

TILE DRAINS.

"Of all the materials which have yet been brought forward for forming the conduits of drains, none are so well fitted for the purpose as tiles or pipes of burnt clay. Draining tiles, especially those in the form of pipes, possess all the qualities which are required in the formation of drains. They are cheap, durable, and portable. They afford a free ingress to water, while they effectually exclude vermin, or earth, and other materials, which often destroy the less perfect forms of drains. They afford a ready passage to the water which enters them, and a moderate amount of superintendence will insure their being properly laid in the drains, while the expedition with which a great extent of draining operations can be executed where they are used permits an extension of this improvement, which could not be even thought of if stones or other weighty materials had to be employed.

DURABILITY.

"There seems to be hardly any limit to the durability of a well-burned pipe in itself; and if they are carefully laid the drains formed of them should be equally durable with themselves.

"Their structure prevents the entrance of gross matters, by which they might become choked, while no amount of violence to which they are likely to be subjected can injure them. Cases have, no doubt, been discovered in which tile drains have become choked by a ferruginous deposit of peroxide of iron, which, having entered in the form of a solution of the protoxide, becomes deposited on contact with the air in the drain. It is of very rare occurrence, and is equally or even more injurious to stone drains.

"The entrance of roots into pipes is almost the only other accident they are liable to; but it is believed that a complete remedy for this, so far as cultivated plants are concerned, can be pointed out, and will be considered under the 'Depth of Drains.' No drain should pass near to water-loving trees, as no crevice, however small, is proof against the entrance of their roots. An instance of stoppage came under our notice where the roots of the common willow had so completely filled the pipe of a drain for thirty feet that not the smallest quantity of water could pass through it. The ash tree is also very destructive to drains.

"A ton of two-inch pipes will furnish forty-eight rods of drain, while a ton of broken stone will only form two rods.

"*Pipe Tiles* have been made of a great variety of shapes, but experience has convinced us that there is no form so good as the cylinder. The cylinder can hardly be placed improperly, if the trench be finished with a semi-cylindrical scoop, as it at once finds its place in the centre of the cavity.

"In clay soils the trench should be cut of a convenient width for the operations of the workman, to within nine inches or a foot of the total depth; the bottoming tool is then employed to take out the remaining portion, in the form of a narrow spit, of just sufficient size to admit the pipe. By this means no more work is done in cutting than is required, while the fitting of the pipes to each other is secured.

"Where a sudden or steep descent occurs in the course of a drain, or where there is a running sand or boggy place, pipes of one size should either be entirely sheathed in larger ones, breaking bond with them, or they should be furnished with collars. These collars are short sections of pipe of such size as to fit upon smaller ones.

"The question of the size of pipes proper for drains is not entirely dependent upon the quantity of rain to be discharged. An important consideration is the probable effect of a slight displacement upon the drain. Some have advocated the use of one-inch pipes; but in some situations these would prove quite insufficient to discharge the quantity required of them. But, apart from the question of capacity, it must be obvious that a very slight sinking of an inch pipe or a slight inaccuracy in placing it would entirely destroy the drain. It is true that this objection is of no force where collars are used; but the cost of collars and trouble and loss of time in fitting them are so great that a larger size of pipe is a cheaper alternative. The smallest size of pipe that can be employed with safety seems to be that of one and a half inch diameter in the bore. In wet districts the two-inch size is to be preferred, although the one and a half inch size may, with propriety and economy, be used in the first one hundred yards of each drain, or throughout, when the drains are under that length, as in such cases the accumulated quantity of water is not great.

"The same rule which governs the flow of water in streams also governs the flow in covered drains, theoretically speaking; but the great inequalities and asperities in pipes occasioned by imperfect joinings and otherwise reduce the results in practice in some cases nearly fifty per cent.

DRAINING OF SPRINGS.

"The drawing off of the pent-up waters, which are the sources of springs, is a department of draining which requires, for its successful practice, a considerable knowledge of the different varieties of stratification which occur, and is, probably, for that reason too little practised. When the theory of springs is understood, and

a knowledge of the strata obtained, the judicious application of a few simple drains, made to communicate with the watery layers, will often dry swamps of great extent, where large sums of money, expended in forming furrow drains in the swamp itself, would leave it but little improved. It is to the application of both kinds of drainage where required that we are to look for the best results; and the judicious drainer will well consider and avail himself of those means which are capable of producing the maximum effect required, without staying to consider whose or what system it is which he employs.

"In endeavoring to drain springs, the point to be sought for is to furnish outlets sufficiently numerous to discharge all the water from the porous bed, at the lowest point to which it reaches in the land to be drained.

"Elkington had the merit of reducing the draining of springs to a system, and the rules which he laid down were so simple and complete that their authority has remained undiminished. Johnstone thus describes the method: 'Draining, according to his (Elkington) principles, depends upon three points: (1) Upon finding out the *main spring*, or cause of the mischief, without which nothing effectual can be done. (2) Upon taking the level of that spring, and ascertaining its *subterranean bearings*, a measure never practised by any till Elkington discovered the advantage to be derived from it; for if the drain is cut a yard below *the line of the spring*, you can never reach the water which issues from it, and by ascertaining that line by means of levelling, you can cut off springs effectually, and, consequently, drain the land in the cheapest and most eligible manner. (3) By making use of the auger to reach or tap the spring where the depth of the drain is not sufficient for the purpose.'

"The term 'main spring' in the passage just quoted refers to what is sometimes called the *true* spring, in contradistinction to those termed *false* springs. The true springs seldom cease to flow, whereas, in dry seasons, the false springs sometimes intermit for considerable periods of time. The true spring is the natural outlet of the enclosed water which gives rise to it, whereas the false springs are occasioned by the backing up of a large quantity of water from the insufficiency of the outlet, till it flows forth at some higher level, in which case they appear above the true springs; or they owe their existence to water which, after having issued from the true spring, has soaked into the soil, and has again appeared where some obstruction forces it to the surface. In the latter case the false are below the true springs.

"Having ascertained the line of the true springs, the next step is to cut a drain sufficiently deep to reach the watery stratum at a short distance below the line of the springs.

"If, upon experiment, it turns out that the superincumbent impervious layer is considerably more than five or six feet in thickness, it will be proper, instead of incurring the great expense of forming an enormously deep drain, to cut a drain four

feet in depth only, and then to sink small wells down to the watery bed at intervals along the course and a little to one side.

"These wells are to be filled with small stones, so as to afford a ready passage for the water to rise up through them to the drain. The conduit may be formed of draining pipes or bricks or stones, as may be most convenient, taking care, however, that the culvert is securely formed, and that the floor of the drain is protected by tile soles or slate or some other material, to prevent the hollowing action of the great flow of water which may be expected to proceed along it. The small stones should be continued to the height of ten or twelve inches above the culvert, so as to furnish a free passage for the water into the chinks and joinings of the culvert. When the watery stratum lies at a depth exceeding eight feet, it is usual, instead of sinking the small wells just described, to make use of an auger, or boring rod, in order to reach the reservoir of water. The auger-hole, like the well, ought also to be sunk a little to one side of the drain, so that the discharge from them may not interrupt the course of the drain, by rising at right angles with the flow of water in it, and so as to guard as much as possible against the choking of the culvert by any bodies which may ascend through the well or auger-holes, such as sand, which is sometimes discharged in large quantity on the first tapping of the spring.

"In the plan the feeder is carried horizontally along the line of springs, so as to communicate with the tail of the watery stratum along the whole of its course. From the horizontal drain or feeder there must be carried a main drain, to convey the water to the nearest brook or water-course; or where there is a large extent of horizontal drain or a great quantity of water, it may be necessary to make several mains. These should always be laid out in the line of the fall of the land, so as to discharge the water as quickly as possible; for it must always be borne in mind that a drain, with a depth of water constantly flowing therein, in a direction transverse to the slope, cannot fail to supply spongy soils with more water than is consistent with a healthy state.

"It often happens that instead of a line of springs there is but one, arising from some chink or fissure communicating with a watery stratum at a considerable depth. Such are the 'well eyes,' 'piping springs,' and 'quags,' as they are called, which one meets with so often in moorland tracts. The proper course to pursue with these is to cut a drain of three or four feet in depth from the point of discharge toward them in a direct line up the ascent, deepening the drain considerably as it approaches the spring. In such cases it is always necessary to reach the orifice of the spring, if the watery stratum itself is out of reach; for the constant flow of water keeps up a rank growth of peat and subaquatic plants, which act like saturated sponges, and retain the water even although the drains be within a few feet of them.

"When the main orifice of the spring has been reached, and its waters are

confined to the channel of the drain, any subsidiary outlets will be more readily discovered, if such exist.

"These must be reached by short drains, branching off the main one described.

"Valleys between rising grounds or hollows in an undulating country are sometimes kept in a marshy state by springs, which are fed from the higher ground in the vicinity. In this case a deep drain, carried along the lowest ground, and either reaching the watery stratum directly, or by means of wells or auger-holes, will generally dry a very large extent, if not the whole, of the swamp.

"It frequently happens that although the surface of a district is wet there exists below it, at some distance, a layer so dry and porous as to be capable of absorbing any quantity of water which may gain access to it. Well-sinkers sometimes meet with such strata, which at once absorb all the water they may have met with in the upper strata. This peculiarity has been taken advantage of in draining, and copious springs may be made to disappear by simply boring an auger-hole into such a stratum, where it is known to exist, and turning the water of the spring into it.

ABSORPTION AND RETENTION IN SOILS.

"All porous bodies have the power of attracting or absorbing liquids in a greater or less degree, by virtue of a particular property which they possess, which has been denominated capillary attraction, from the minute tubes in which its influence is exhibited. Capillary attraction acts more rapidly in some soils than in others; thus we find that in pure clays it exhibits its influence but slowly; in agricultural clays, into the composition of which some of the more porous earths enter, its action is more rapid; while gravel, sand, or peat—which latter may be likened to a vegetable sponge—speedily absorb as much water as they can hold on being brought in contact with it. This power of attraction also manifests itself on the surface of bodies, and may then be called the attraction of adhesion. Soils, in common with all other bodies, possess this property, and in a greater or less degree, according to the aggregate surface which the particles of a given bulk present.

"Thus clay may, by means of kneading, be made to contain so large a quantity of water as that at last it may almost be supposed to be divided into infinitesimally thin layers, having each a film of water adhering to it on either side.

"Such soils, again, as sand or chalk, the particles of which are coarser, exert a less degree of adhesive attraction for water. Professor Schübler, of Tübingen, found that sand was capable of holding twenty-five per cent., loamy soil forty per cent., clay loam fifty per cent., and pure clay seventy per cent. of their own weights of water, when the water was merely poured upon them in a dry state, till it began to drop. Sir Humphry Davy found that the power of attraction for water generally proved an index to the agricultural value of soils. This sort of attraction, however, depends upon other causes besides the adhesion to which we have been alluding. The power

of attraction which certain substances exhibit for the *vapor* of water is more akin to the force which enables certain porous bodies to absorb and retain many times their volume of the different gases, as charcoal or ammonia, of which it is said to absorb ninety times its own bulk. And as finely-divided mineral matter, as well as vegetable matter in a state of decay, at the same time that they possess this power in a high degree, are also indications of fertility, according to the proportion in which a soil contains them, so the relationship observed by Davy between fertility in soils and their affinity for aqueous vapor admits of easy and satisfactory explanation. Clay soils are called impervious soils, because in their natural state they resist the passage of water through them. They are also called retentive soils, because if water does gain access to them their power of adhesion enables them to retain a large quantity of it for a great length of time. These are properties which have a very injurious effect on all agricultural operations, and their removal is one of the results which the scientific drainer seeks to effect.

"We have it in our power to increase for a time the permeability of clay soils by mechanical means.

"By pulverizing them when dry, we so separate their parts as to afford a ready passage to water.

"Natural causes also have a like tendency. The summer drouth causes numerous cracks and fissures, which admit the rains to all parts of the soil. This temporary permeability on undrained clay lands is, however, found to be an evil; for by means of it the rain is enabled to penetrate and saturate the soil, in autumn, to a considerable depth; while their great adhesive power retains it to an extent which reduces the soil to a state of quagmire during the winter months. Accordingly, we find that the clay-land farmer is by no means ambitious to pulverize his soil very finely when it is undrained. He prefers a rough clod on his wheat land, which has to contend with the watery influences of the winter months; and he very properly eschews all attempts at subsoiling in the wet months of the year, or anything which may bring into play the water-retaining powers of his soil. When clay is properly and thoroughly drained, however, a new element is brought into operation by the constant supply of air to the soil. By its means the permeability is increased, while the adhesiveness, if not removed, is at least prevented from exercising any other than a beneficial influence.

"The water-resisting power of soil which has become slightly dry is familiar to every farmer, although many may not be aware of the cause.

"When a piece of damp land is plowed it is very apt to get 'soured' if rain falls immediately after it is turned over; whereas, if it gets somewhat dry before the rain falls it is but little injured. This effect is entirely owing to the air, which takes the place of the evaporated moisture, and acts like a waterproof garment in warding off the rain.

"When rain falls upon the surface of soils which rest upon an impervious or very slightly pervious substratum it is gradually diffused through all the porous and absorbent portions by capillary attraction, assisted in clays by the cracks and fissures they may contain.

"If the fall continues the soil becomes saturated, and the excess then forms pools, or makes its escape by flowing over the surface to any neighboring water-course which may exist.

"When the rain ceases to fall those parts of the surface which are higher than the rest gradually become drier, because the water being no longer poured upon them, the law of gravitation produces its natural results. Now, we cannot raise the soil, but we can lower the impervious or saturated bed on which it rests, and so increase the depth of porous soil.

"If we cut a trench or drain into the subsoil, we immediately disarrange the hydrostatic relations which exist in its neighborhood in a greater or less degree, according to its depth. The capillary force which retained the water in the soil to a height of a few inches is no longer able to sustain it when the height is increased to feet, and a portion descends into the drain, leaving the upper part of the surface comparatively dry. Now, the unequal pressure of different heights of water in the land immediately compels the portion of soil next to that from which the water has been drawn to yield up a portion of its excess to it, obtaining, in its turn, a portion from that farther off, and so on through the whole mass of the surface soil; but as fast as it is supplied the drain draws it off, so that in a short time the level of the water in the whole mass is lowered. This is the action which is indicated by the term *drawing*, which is so often applied to drains, probably in many cases without any very definite idea of its meaning.

"All soils, too, but especially those containing clay, possess the property of expanding when wetted, and contracting when dried; so that after the drain has removed a portion of the water a considerable contraction takes place, especially in a dry season; but as the ends of the field cannot approach each other to suit the contraction, both soil and subsoil are torn asunder, and divided into small portions by a network of cracks and fissures, the sum of which represents the amount of lateral contraction throughout the field. This circumstance is familiar to every one, and most persons who are conversant with strong land are aware that in some seasons the fissures extend to a great depth.

"These phenomena are of the utmost consequence in draining land; indeed, it may well be doubted whether without such properties in the soil or subsoil we could drain our clay lands at all. It is worthy of remark here that as on stiff soils the cracking action is strongest, nature seems to second the efforts of man, and compensates the want of porosity in clays by the more powerful development of a property which, under skilful treatment, renders them almost as easy to drain as the

more porous soils. The tendency of draining is to increase and guide the course of this cracking action.

"The main fissures all commence at the drain, and spread from it in almost straight lines into the subsoil, forming so many minor drains or feeders, all leading to the conduit.

"These main fissures have numerous small ones diverging from them, so that the whole mass of earth is divided and subdivided into the most minute portions. The main fissures are at first small, but gradually enlarge as the dryness increases, and at the same time lengthen out, so that when a very dry season happens they may be traced the whole way between the drains.

"When the fissures are once formed the falling of loose earth into them and the growing action of the water which passes through them prevent them from ever closing so perfectly as to hinder the passage of water, while each successive summer produces new fissures, till the whole body of the subsoil is pervaded by a perfect network of them, which gradually alters the very nature of both soil and subsoil, and in connection with judicious and liberal manuring has the effect of converting poor cold clays into something not very different from a good clay loam.

DEPTH OF COVERED DRAINS.

"Such drains have a twofold office to perform. They have to collect the superfluous water from the soil, and then to carry it off in a certain fixed course. They must, therefore, afford free access to water at all points, and, at the same time, prevent that which they have collected from leaving them by any other way but by their own channels. They must also be covered to such a depth as not to interfere with the working of the land. Let us fix the minimum depth of this covering of soil.

"Modern agriculture, practical as well as theoretical, has shown that 'to have large crops we must have a deep soil.' The soil is a great storehouse of materials of which plants are composed; but these require a certain amount of preparation before they become fitting food for our crops. That preparation is effected by exposing them to the action of the elements, through the operation of tillage. Plants have the peculiar property of being able to adapt themselves to almost any amount of food which may be presented to them. Take turnips, for example; these will be found varying from the size of a pigeon's egg to that of a man's head, or larger according to the amount of food with which they have been supplied. It is, therefore, an object of first importance that a large quantity of what chemists call the *inorganic* constituents of plants be constantly in course of preparation in a soil deeply stirred by the subsoiler or trench plow. If, then, it is considered probable, or even possible, that subsoiling and trench plowing may become general, it is imperative that drains be so put in as not to interfere with or be injured by such operations.

HILDA D. 6683.

AT 9 YEARS OLD.

VERNA HERD.

FREDERIC BRONSON, SOUTHPORT, CONNECTICUT.

"Subsoiling as hitherto practised has reached a depth of eighteen inches, but it is highly probable that future experience may demand a still greater depth. If, however, we take the depth at eighteen inches, we cannot with safety place the *upper* part of the drain nearer to the surface than this depth at least.

"But, further, if such an instrument as a subsoiler was to pass close to the top of a drain, it could not fail to injure or destroy it; and even although an inch or two of soil were to intervene between the instrument and the top of the drain, still the shaking and crushing which take place would, in all probability, materially injure it. It must, therefore, be concluded that from four to six inches of soil must be left undisturbed between the *top* of the drain and the subsoiler, so as to insure the safety of the former. If to this we add the depth of the subsoiling operations, we obtain data showing that the top of a drain should never be nearer the surface than twenty-two to twenty-four inches.

"Where a precise rule cannot be laid down, it is best to keep on the safe side; we must therefore assume that there should be at least twenty-four inches of soil *above* every drain.

RESULTS REQUIRED BY DEPTH OF DRAINS.

"There is hardly any subject connected with agriculture which has excited such an amount of controversy as the proper depth for drains.

"A careful consideration of the very numerous recorded opinions published during the last few years only leaves the conviction that there is no settled rule as to the depth of drains *best* adapted to all soils and all circumstances.

"We say *best* adapted, for we believe that there is a depth and distance of drain which will effectually remove the *surface water* from all soils; but whether that might be the most economical and most judicious mode of proceeding in particular cases can only be settled by a thorough investigation of the particular case to which it is to be applied.

"Cases are sometimes adduced as successful examples of deep thorough draining where the drains are placed at great intervals, and in some cases ten feet in depth. These have no claim to be considered as examples of thorough draining at all. They are merely successful examples of Elkington's principles to the removal of springs, by furnishing outlets to the water in the stratum from which they arise. The proper function of thorough draining is the removal of rain-water, which would otherwise lodge and stagnate in retentive soils.

"Gravitation is not the only agent to be considered in thorough draining.

"The first consideration to which we must address ourselves, in fixing the depth of drains, is the depth of soil which is required to be laid dry. There is a limit to the depth of drained soil required for the purposes of cultivation; and any extra expenditure in drying soil at greater depths than will yield a return must be regarded as waste.

"It is probable that, as a general rule, the roots of our cultivated plants do not penetrate to a greater depth than two feet, or two feet six inches, even in soil fitted for their reception. That they descend to the former, at least, of these depths, has been put beyond dispute, by the roots of mangold having been found in a drain, the top of which was two feet from the surface; but there is no case recorded in which the roots of cultivated plants have been found in three-feet drains. This is, no doubt, only negative testimony; still, the spirit of inquiry in regard to draining would probably have discovered such a case if it had occurred. It will not be a very forced conclusion if we take it for granted that thirty inches represents the ordinary depth to which the plants of agriculture are likely to penetrate.

"It is further necessary that water should not be allowed so near the surface as to create any chilling effect on the vegetation. It is also desirable that it should not be so near as to be capable of injuring the surface, by ascending in too great quantities, by means of capillary attraction. A depth of from three to four feet seems to be as great a depth of drained soil as can be required.

"But there are still other considerations which must influence us in fixing the proper depth for drains in particular cases. In the case of a porous soil and subsoil saturated with water, in consequence of resting upon an impervious stratum, it will be proper, if practicable, to sink entirely through the porous stratum, and to form the conduit of the drain in the impervious layer. By this plan of proceeding a very limited number of drains may be made to dry a great extent of surface; for it may be laid down as a general rule in regard to *very porous soils*, that the deeper the drain the further it will draw.

"It sometimes happens in clayey soil that at no great distance from the surface there is a watery stratum composed of porous materials.

"If this stratum is not more than six or seven feet from the surface, it may be turned to excellent account in draining; for by cutting a smaller number of drains down to it than would have been required in ordinary cases, it will not only be emptied of its own water, but will be converted into one extensive natural drain under the whole surface, of which the drains which are cut will form the outlets. In the drainage of *shallow* peat bogs it is always desirable to cut through the peat to the solid stratum on which it rests, for the very unstable nature of the peat renders it a very bad foundation on which to form a drain.

"It appears, then, that drains ought to vary in depth according to each particular case to which they are to be applied.

"Drains in porous soils may be deep and wide apart, because the water will readily flow to them from all parts, and the greater the depth, the more powerfully will the capillary attraction of the soil be neutralized.

"In clay soils, again, the drain has not only to carry away the water, but to aid in maintaining the artificial porosity of the soil, by means of which the water is to

gain admission to it. This it cannot effect if placed at a depth to which the shrinkage of the soil does not extend; and it must not be forgotten that this shrinking action is much greater in certain parts of the country than in others, and in some seasons than in others.

"The comparatively slight benefit derived in many cases from drains in clay during the first season after their formation, more especially if that has been a wet one, is sufficient confirmation of this view of the matter.

"Our own experience and observation, combined with the experience of others, have convinced us that no drain should be put in at a less depth than three feet, where this is practicable.

"That clay-land farmers will be found to advocate the use of much shallower drains, and will point to the water standing above such *deep* drains (as they style them) as a conclusive proof of their inefficiency, is no doubt true; but an examination of the shallowest drains, where the land has been stirred or trod upon when wet, will exhibit the same appearance. One inch of wet and worked clay will prevent water from passing through, so long as it is kept wet, as effectually as a yard will do.

"The true remedy is to refrain from working such land when it is too moist; any stirring of it in that state is only undoing all that the summer drouth has effected in rendering it porous.

"Taking three feet as a minimum depth for drains, three and a half and four feet will be found safe and efficient depths at which to place them, where there are no peculiar circumstances demanding special depths to suit them. What the nature of these circumstances is has been stated in a general way; the limits to which we are necessarily circumscribed in such a work as this prevent our referring to them more in detail. Neither our nomenclature of soils nor our knowledge of the laws which govern the flow of water through them is at this time sufficiently exact to permit us to frame rules to be implicitly followed.

FREQUENCY OF DRAINS.

"The distances apart at which drains ought to be placed is a subject of great importance, and one on which much difference of opinion exists.

"Smith contends that drains should be placed at very short intervals. He says: 'In laying off the drains, the first object for consideration is the nature of the subsoil. If it consists of a strong stiffy 'till' or a dead sandy clay, then the distance from drain to drain should not exceed from ten to fifteen feet; if a lighter and more porous subsoil, a distance of from eighteen to twenty-four feet will be close enough; and in very open subsoils forty feet distance may be sufficient.'

"On the other hand, Parkes, who represents the deep and distant drain system, says: 'It consists with my own practice, at the present time, that drains are being

executed at depths of from four to six feet, according to soil and outfall, and at distances varying from twenty-four to sixty-six feet, complete efficiency being the end studied, and the proof of such efficiency being that, after a due period given for bringing about drainage action in soils unused to it, the water should not stand higher, or much higher, in a hole dug in the middle between a pair of drains than the level of those drains.'

"The distance, like the depth of drains, must be governed by a variety of circumstances, all of which demand strict and careful investigation before proceeding to set off any system of drainage. The most important of these considerations is the nature of the subsoil, and the effects which the removal of stagnant water will produce upon it. If the subsoil be very porous, or, although not porous in itself, if it rests upon a porous substratum, from which the drains are calculated to remove the water, the parallel drains may be deep and placed at considerable intervals. On the other hand, where the subsoil is impervious the drains must be placed at much shorter intervals.

"In estimating the imperviousness of subsoils, it is not only necessary to have a due consideration of their nature before drainage; the effects which drainage will produce upon them must also be taken into account. In some soils, as we have seen, a great degree of artificial porosity will be produced by draining; on these the drains may, with propriety, be at wider intervals than on soils in which this cracking action is less powerfully developed.

"The subsoils upon which draining acts to a shorter distance perhaps than any others are those clay subsoils, containing a large quantity of imbedded stones, which characterize a large portion of the surface of the carboniferous and Cambrian formations. They are often so completely indurated as to be almost impervious to water, and when cut into are almost dry, even although the surface soil which rests upon them may be at the same time of the consistence of soft soap. The great portion of their mass, which consists of inexpansible materials, prevents the production of that artificial porosity which plays such an important part in the draining of the purer clays. Subsoiling as an adjunct to drainage on such soils proves of the greatest value.

"In planning the draining of clay soils, climate must also be allowed its due effect.

"We have seen that a drain may pass very near a spring without drawing off its waters, because the perennial supply of water prevents the formation of fissures by shrinkage.

"Our own experience over a considerable range of soils and climate, collated with the experience of a very large number of careful and unprejudiced observers, has convinced us that the extreme distances named both by Smith and Parkes are to be avoided.

"There can hardly occur any instance in which drains require to be placed at such close intervals as ten feet. There may be isolated spots in a field into which it may be necessary to extend a branch, to draw off some minor spring; but, as a general rule, it may be held that draining at ten feet apart is a waste of labor and materials. On the other hand, we think sixty-six feet an extreme and unsafe distance for thorough draining.

"A scale of distances ranging from eighteen to forty feet will be found to suit almost any case which may occur, while it will not incur the charge of waste of means on the one hand, or inefficiency on the other. We have found a distance of twenty-four feet, with a depth of from three and a half to four feet, produce very perfect results on soils of considerable tenacity, in districts subject to more than the average fall of rain in the British Islands. These will be found safe examples to follow under similar circumstances; and where there is nothing in the formation of the subsoil calling for a particular arrangement to meet it, these intervals and depths will generally be found perfectly successful.

DIRECTION AND DECLIVITY OF DRAINS.

"As the law of gravitation, when permitted to act by either natural or artificial porosity, is that which governs the descent of water into drains, the chief object to be considered in laying out drains is the placing of them in such a position as will bring this principle to bear most fully upon them, in reference to the land on which they are intended to act.

"Where land is altogether level, all parts of the surface will be in the same relative position as to height above any drain which may be cut into it. In such a case, therefore, as in the flat alluvial tracts which border some rivers, and are to be met with in various districts, the choice of direction for the drains ought to depend, in a great measure, on the convenience of outfall. It is a matter of no consequence whether the drains run in the line of the ridges, at right angles with or diagonally to them. The main consideration necessary to be attended to is how they may be most conveniently disposed in reference to the main drain or place of discharge.

"Where, however, the land is possessed of any degree of slope, other considerations must guide the drainer.

"Where the slope is very slight, the necessity for selecting the line in which it is greatest for the direction of the drains, in order to obtain a flow in them, will be admitted by all. This rule ought also to obtain *in all cases* of sloping land, though for different reasons.

"There are reasons for selecting the line of the greatest fall for the direction of the drains, which are applicable to all lands alike.

"The most important of these is, *that the line of the greatest fall is the only line in which a drain is relatively lower than the land on either side of it.*

LAYING OUT DRAINS.

"Before proceeding to lay out drains, the depth, frequency, and kind of drain to be used must be fixed upon. In deciding upon these points an experimental examination of the subsoil should take place, where its nature is not already known.

"Pits of three, four, five, or six feet should be dug, and these questions decided upon the principles already explained, according to the indications which the pits afford. In deciding on the frequency of the drains, it is worthy of reiteration that extreme distances ought in every case to be avoided. A due regard should be paid to economy of labor and materials, but the object of the drainer ought rather to be to effect a perfect drainage than to convert extensive works into an experimental trial of the effect produced by drains at wide intervals.

"The same remarks apply to the size of pipes to be used. One-inch pipes ought *never* to be used without collars, and the locality must determine whether they may be used at all. In some districts, if placed at twenty-four feet apart, they would not void one-third part of the water required of them.

THE PLACE OF OUTFALL.

"This should always afford a free and clear outlet to the drains, and must of necessity be at the lowest point of the land to be drained. It will often be found necessary to cut across other land, in order to obtain a proper outfall; but this is an expense which should readily be gone to, where drains require it; for draining without a proper and clear outfall is only a waste of money. The position of the proper points of outfall should be determined by means of levelling instruments; and wherever there is a considerable extent of work to be done a competent surveyor should be employed to fix these, as well as some other points which we shall have to advert to, if not to lay out the whole works; for it cannot be too strongly enforced that there is no more worthless economy than that which entrusts the planning of operations involving an outlay of hundreds or thousands to the rule of thumb proceedings of some laborer whose sole qualification is derived from the fact of his having helped to *cut* some hundreds of rods of drains.

POSITIONS OF THE MINOR DRAINS.

"There is a very simple mode of laying out the minor drains, which will apply to most cases, or, indeed, to all, although in some its application may be more difficult. The surface of each field must be regarded as being made up of one or more planes, as the case may be, for each of which the drains should be laid out separately. Level lines are to be set out a little below the upper edge of each of these planes; and the drains must then be made to cross these lines at right angles. By this means the drains will run in the line of the greatest slope, no matter how distorted the surface of the field may be.

"When the furrows happen to coincide with the line of drains, it may sometimes be proper to take advantage of them, in order to lessen the cost of cutting; but where either their distances or direction do not coincide with those which are ascertained to be the proper ones, they should without hesitation be disregarded.

THE POSITION AND SIZE OF THE MAIN DRAINS.

"All the minor drains should be made to discharge into mains or submains, and not directly into an open ditch or water-course. There are many reasons for this.

"Grass and weeds, and débris of various kinds, collect in open ditches, and are apt to choke up the mouths of drains, and thus greatly injure them, especially if the fall is slight; but when many drains are collected into one main, the run of water at its mouth becomes so strong as to clear away and overcome these obstacles, if through negligence they are allowed to accumulate. It is also much more easy for the farmer to look after the working of a few main drain mouths than to have a large number of small drains requiring examination from time to time.

"There is also the further advantage of there being less risk of damage from roots in the fences entering the drains, and the entrance of vermin can more readily be guarded against.

"The mains should intercept all the minor drains, at eighteen or twenty feet distance from the fences to which they tend, and conduct the accumulated waters toward the place of outfall. There must also be submains in all the hollows. As a general rule, there should be a main to receive the waters from every five acres, as a great current is apt to injure them.

"The rule of Leslie which has been given will serve to determine the necessary sizes of mains required, by deducting in round numbers twenty-five per cent. of the gross discharging power, on account of friction, and some other phenomena connected with the discharge of water from pipes. Main drains may be conveniently formed of one or more large pipe tiles. Main drains should be three inches deeper than the minor drains, so as to give the latter a drip, and prevent any damming up from sand. The minor drains should enter the mains with a curve, in the direction of the current of the mains; and when they enter on both sides of the mains they should not be exactly opposite to each other, as such an arrangement is apt to produce stoppage of the full flow in the mains.

EXCAVATIONS.

"In excavating the trenches for drains, the first operation should be to cut the main, beginning at the place of outlet. The width must be carefully and neatly set out with a line, as indeed that of the whole of the drains should be. The earth should be thrown on the lower side of the main. The minor drains are next to be

cut, commencing with those farthest from the outlet. The object of this is that as fast as each drain is cut it may be laid with pipes, or other material, and covered in, as well as the pieces of main between it and the next mouth or joining; for nothing is more improper than having a great extent of drains open at one time, as a moderate degree of frost will cause much expense and trouble from the crumbling in of the sides. Two workmen generally work together in each trench, commencing at the lower end, that they may not be incommoded with water. As soon as they have completed it, it should be carefully inspected by the overseer of the work, after which the laying of materials should be immediately proceeded with. Where pipes or tiles are used, these should previously be laid ready along the sides of the trenches, taking care, however, in laying horseshoe tiles down from the carts, to place them on their backs; for if their edges are placed in contact with the earth, a very slight degree of frost causes it to adhere to them with such tenacity that they cannot be used until a thaw sets in.

"The laying of materials should commence at the upper end of the drains, so that all mud may be cleared away without the risk of its entering the conduits.

"As a general rule, the laying of materials should be performed by a trustworthy person paid by the day, for on the perfection of this operation the value of the drain in a great measure depends. The joinings at the mains should be made either by means of tiles made for the purpose, by having a hole cut in the side before being burned, or by neatly chipping out a small piece by a smart blow in the proper direction. All faulty tiles should be rejected, as holes in drains are fruitful sources of injury.

"When the materials for the conduit have been placed in the trench, the earth may either be returned upon them by manual labor or by the plow.

"Where the plow is to be used, the earth must be placed on the right and left of each alternate trench, so that the plow may make a full bout by passing up one drain and down another. The horses walk on either side of the trench, and a wide swingle-tree must be used. Each drain will require from four to six furrows to complete the turning in. Where labor is not too high, the spade or drag hoe will generally be found nearly as cheap methods of filling in as the plow; and with the latter there is a great risk of accident to the horses."

The Theory of Drainage.*

BY LYON PLAYFAIR.

"The theory of drainage, an operation in agriculture of almost equal importance to that of plowing, is, in reality, very simple, although it depends upon several physical and chemical conditions in themselves very distinct. The mechanical

* Morton's Encyclopædia of Agriculture.

conditions effected in thorough drainage require: (1) That all the rain which falls on the surface should quickly sink to the level of the drain, and be carried off; (2) that, in thus sinking, the finely divided portions of the soil should not be carried away, but that the water should be filtered before entering the drain; (3) that the depth of the drain should be sufficient to carry off underground water, and produce amelioration in the soil to sufficient depth. Keeping these mechanical conditions in view, the two principal effects produced, and which require explanation, are the following: (1) The increased temperature of the soil, by which crops mature upon it with greater rapidity; (2) its increased fertility and better adaptation for all kinds of cultivated crops.

"These two main improvements require separate consideration.

"When water stagnates in a soil, air is at the same time excluded, and the necessary amelioration of the organic and inorganic ingredients cannot be effected. In all cultivated soils decaying matter has a positively injurious action, even on its mineral ingredients, by reducing the higher state of the oxidation of the iron generally present into the lower and injurious condition. In soils permeable to air, this evil is at once counteracted by a fresh absorption of oxygen from the atmosphere; but in soils in which water stagnates this remedial process does not exist.

"The heat of the sun falling upon wet land does not exercise its genial influence in promoting the growth of plants, but expends it in evaporation of the stagnant water. In doing this much of the sensible heat is rendered latent, or, in other words, is deprived of its warming properties. Water, in being converted into steam, absorbs or renders latent an enormous amount of heat, which is of course robbed from the soil; for it otherwise would be used in the more profitable manner of maturing the crops growing upon it. Some idea may be entertained of the amount of heat absorbed and rendered useless to the plants growing on the soil, if a special case be taken for illustration. It is found that porous chalk soils evaporate only one half the fall of rain, the rest infiltrating and running off as springs and streams, or being afterward found as wells.

"This, therefore, is a case very favorable to a wet soil, which would in reality allow a very much smaller quantity of rain to pass it; nevertheless, the porous land would require an expenditure of nearly twelve hundred weight of coal per day to evaporate artificially one half the rain which falls on an acre during the year. In other words, more than two hundred and nineteen tons of coal annually would be required for every acre of undrained land, so as to allow the free use of the sun's rays for the legitimate purpose of growing and maturing the crops cultivated upon it.

"It will not, therefore, be surprising that undrained soils are, in the language of the farmer, '*cold.*'

"But in addition to the heat abstracted by the evaporation of water in undrained soils, other physical properties combine in reducing their temperature.

"One of these is the low conducting power of water. When the sun's rays infringe upon the surface of a watery soil, it raises the temperature of the water; but the heated water, being lighter than the cold water beneath, remains on the surface, and the heat cannot penetrate into the interior of the soil. But at night the very reverse action ensues; for the water, rendered cold at the top, descends, by an interchange with the hotter water beneath, which, in its turn, being cooled again, sinks; and thus the whole soil becomes quickly reduced to the same temperature as the external air, and the roots of the plant frequently suffer from being thus chilled. Water radiates its own heat freely into space, and hence a watery soil is quickly cooled in a cold night by the heat which the water distributes into the colder atmosphere.

"All these evils tend to reduce the temperature of undrained soils, and to render them less fitted for the growth of cultivated crops, which, in general, require a genial warmth.

"When soils are drained to a sufficient depth, the condition of the soil, with regard to temperature, is entirely altered. The redundant water does not now stagnate on it, but is immediately carried off. The aqueous moisture of the atmosphere, condensed into raindrops, is of a higher temperature than the air itself. This arises from the circumstance that when vapor becomes liquid it renders sensible that latent heat which it had absorbed to keep it in the gaseous state. The rain, therefore, in its passage communicates its own natural heat in addition to the higher heat of the soil's surface, and quickly percolating through it, and being removed by drainage, it does not require an additional amount for the purpose of evaporation. The similar warming action of rain on a drained soil is also exerted by dew in the coldness of the night.

"Soils and the plants upon them radiate heat into the atmosphere, from which is deposited water in the form of dew, as soon as their temperature is lower than that of the surrounding air. But the dew deposited upon the cold surface still preserves the latent heat, rendered sensible by its condensation, and this heat prevents the extreme chilling which would otherwise take place. The texture and porosity of drained soil soon change by chemical actions, so that they become more absorptive for moisture during dry weather. In fact, such soils do attract a large quantity of the aqueous vapor always present in the air, even in the driest weather, and thus prevent the parching of plants from the heat of the sun in the absence of moisture.

"These very obvious improvements in the condition of soils, depending upon their relation to heat and moisture, have practically the effect of an amelioration in the climate of a district.

"The sun's rays now produce their full effect on the soil and on the crops, without being robbed of their heat by the stagnant water of the soil, unable to effect

its escape except by evaporation. The chemical effects of drainage, in promoting increased fertility, are not less striking. Rain-water always contains in solution air, carbonic acid, and ammonia. The first two ingredients are among the most powerful disintegrators of a soil. The oxygen of the air and the carbonic acid being both in a highly condensed form, by being dissolved exert very powerful affinities on the ingredients of the soil. The oxygen attacks and oxidizes the iron ; the carbonic acid, seizing the lime and potash and other alkaline ingredients of the soil, produces further disintegration, and renders available the locked-up ingredients of this magazine of nutriment. Before these can be used by plants they must be rendered soluble ; and this is only effected by the free and renewed access of rain and air. The ready passage of both of these, therefore, enables the soil to yield up its concealed nutriment. The soil thus acted upon becomes soon changed to a certain extent in its mechanical as well as its chemical character. The particles of the soil being comminuted, are rendered more absorptive of the gaseous foods of plants—carbonic acid and ammonia. The porous soil thus becomes richer in organic food at the same time that it is made to yield its nutritive mineral riches to the plants growing upon it. The peculiar chemical action exerted by the surface of soils for fixing ammonia and other soluble ingredients in water becomes more powerfully exerted.

"The water being removed from beneath the roots of plants by an adequately deep drainage, prevents the depression of temperature in the manner described. But, at the same time, it opens a new magazine of nutriment, by enabling the air and carbonic acid to reach the lower parts of the soil, and to ameliorate its injurious ingredients, while it liberates those which are useful.

"The plant has, therefore, a wider range in which it may seek its food, and is thus enabled to extend its roots in search of nutritive matter, which it formerly refused to do in a cold wet soil, in which the constituents were unfit for its healthy growth.

"Hence it is apparent that drainage is a most powerful agent in agriculture. By it the temperature and therefore the climate of soils is elevated ; their porosity for moisture, though not for *wet*, is increased ; their disintegration is effected, and nutritive, soluble materials are liberated ; the organic gaseous food of plants is furnished by absorptive action in greater quantity than before ; and the injurious organic and mineral ingredients of the soil are so far altered as to be positively beneficial to vegetation. With such advantages it is not surprising that drainage has become an essential operation in agriculture."

DRAINAGE IN AMERICA.

As compared with Great Britain, the climate of America presents a greater variety, but with a lower average rainfall, a less humid atmosphere, and greater rapidity of evaporation, because of the very much larger prevalence of sunshine at all

seasons of the year. Nevertheless, all that has been said in favor of drainage and its results applies with equal force to the greater part of the United States and Canada, while many portions of the country require in connection with thorough underdrainage an equally elaborate system of irrigation either with river water or the sewage of towns, in order to derive the full benefit of the system of drainage. The testimony of those who have had long experience in drainage, where the work was thoroughly well done (and all else is absolute waste of money and labor), assert that with drainage alone the crops are so largely increased in quantity and improved in quality that the expense of the original cost is repaid in from two to three years. It is believed by many who have given the subject careful study that in America great advantages will accrue if the systems of drainage and irrigation shall be combined for all soils where practicable.

Great improvement has been made in recent years in the quality of pipe tile. The best are those that are hard-baked and glazed.

The plows and machines for use in soils which are free from stone promise to greatly lessen the cost. Vast areas of the best land are at present saturated a large part of the year, or entirely and perennially drowned. These are also a prolific source of fevers, ill-health, and poverty, to the majority of the inhabitants of neighboring districts.

Drainage is the only remedy.

Among the various ditching machines, there are several that promise to give aid in reducing the cost of excavation, and also greatly facilitating the speed of the work.

VALUE OF MANURE.

"No cattle, no dung; no dung, no crop."—*Flemish Adage.*

Most farmers keep themselves in a state bordering on impoverishment by a neglect to save manures. To allow the liquids to percolate through a porous soil beneath the barn and stable yards is to lose the greater part of manurial value. According to the best authorities, the urine is of more value than the solid excrement, being ordinarily of double value, and under high feed is quadruple the value of the dung of equal weight. According to experiments of German chemists, fully ninety-five per cent. of all the valuable fertilizing elements digested were recovered in the liquid excrement. The undigested elements are passed as solid excrement. The feed was barley meal.

NITROGEN STORED UP AND VOIDED FOR 100 CONSUMED.

Animals.	Stored up as Increase.	Voided as Solid Excrement.	Voided as Liquid Excrement.	In Total Excrement.
Sheep	4.3	16.7	79.0	95.7
Oxen	3.9	22.6	73.5	96.1
Pigs	14.7	21.0	64.3	85.3

ASH CONSTITUENTS STORED UP AND VOIDED FOR 100 CONSUMED.

Animals.	Stored up as Increase.	Voided in Total Excrement.
Sheep	3.8	96.2
Oxen	2.3	97.7
Pigs	4.5	95.5

The combined excrements are rich in both nitrogen and mineral constituents. Two thousand pounds of the solid would contain fourteen pounds, and of the liquid twenty-eight pounds, on light feed; but a rich food would give nearly double for the liquid, or more than fifty pounds. The great essential to an improved agriculture is the saving of all manure, and then properly applying it to the soil when and where needed. It is simply a question of prosperity with manure, or poverty without manure.

TABLE OF MANURE VALUES.

Article.	Estimated Value of Manure from 2000 lbs.
1. Linseed Cake	$19.54
2. Peas	13.65
3. Clover Hay	9.65
4. Oats	7.40
5. Wheat	7.08
6. Maize	6.76
7. Meadow Hay	6.43
8. Barley	6.27
9. Oat Straw	2.90
10. Wheat Straw	2.68

Article.	Estimated Value of Manure from 2000 lbs.
11. Barley Straw	$2.26
12. Potatoes	1.51
13. Mangolds	1.08
14. Carrots	.86

The above is a part of the table from Stewart's work, "Feeding Animals," which is made up from the estimates of Sir J. B. Lawes.

TABLES SHOWING AMOUNT OF NITROGEN, POTASH, AND PHOSPHORIC ACID IN 1000 POUNDS, AND THEIR VALUE PER TON AT A LOW ESTIMATE.

SUBSTANCES. Manufactured Products.	Dry Matter.	Nitrogen.	Potash.	Phosphoric Acid.	Manure, Value per Ton.
		18 cts.	6 cts.	10 cts.	
	Lbs.	Lbs.	Lbs.	Lbs.	
1. Linseed Cake	880	45.0	14.7	19.6	$21.88
2. Linseed Meal (extracted)	903	59.8	17.0	25.6	28.68
3. Wheat Bran	865	22.0	14.8	32.3	16.15
4. Rye Bran	875	23.2	19.3	34.2	16.43
5. Millet Meal	860	18.3	2.3	5.5	8.32

GRAINS AND SEEDS.

SUBSTANCES.	Dry Matter.	Nitrogen.	Potash.	Phosphoric Acid.	Manure, Value per Ton.
		18 cts.	6 cts.	10 cts.	
	Lbs.	Lbs.	Lbs.	Lbs.	
1. Beans	855	41.0	12.0	11.6	$18.52
2. Vetches	864	44.0	6.3	7.9	18.17
3. Flaxseed	905	36.0	12.3	15.4	17.51
4. Peas	857	36.0	9.8	8.8	15.87
5. Oats	870	20.6	4.5	6.2	10.27
6. Wheat	856	18.8	5.4	8.0	9.01
7. Rye	851	17.6	5.4	8.2	8.62
8. Barley	860	17.0	4.9	7.3	8.16

HAY.

Substances.	Dry Matter.	Nitrogen.	Potash.	Phosphoric Acid.	Manure, Value per Ton.
		18 cts.	6 cts.	10 cts.	
	Lbs.	Lbs.	Lbs.	Lbs.	
1. Green Vetches	840	22.7	30.9	9.4	$13.75
2. Green Peas	833	22.8	29.6	9.7	13.69
3. White Clover	840	23.8	10.6	8.5	11.53
4. Lucern	840	23.0	15.2	5.1	11.00
5. Red Clover, in blossom	840	19.7	19.5	5.6	10.55
6. Green Oats	855	14.7	24.1	5.1	9.20
7. Timothy	856	15.5	17.2	6.8	9.00
8. Meadow Hay	857	15.5	16.8	3.8	8.35
9. Red Clover, ripe	840	15.0	12.2	3.5	7.56
10. Dead Ripe Hay	856	12.0	5.0	2.9	5.56

GREEN FODDER.

Substances.	Dry Matter.	Nitrogen.	Potash.	Phosphoric Acid.	Manure, Value per Ton.
		18 cts.	6 cts.	10 cts.	
	Lbs.	Lbs.	Lbs.	Lbs.	
1. Lucern	247	7.0	4.5	1.5	$2.94
2. Hungarian Millet	320	5.3	8.6	1.3	2.54
3. Rye, in blossom	300	5.3	6.3	2.4	2.51
4. Green Vetches	180	4.9	6.6	2.0	2.35
5. Green Peas	185	5.1	5.6	1.8	2.34
6. Red Clover	200	5.2	4.6	1.3	2.27
7. Meadow Grass	300	4.8	6.0	1.5	2.24
8. Swedish Clover	185	5.2	3.5	1.0	2.18
9. White Clover	190	5.0	2.4	2.0	2.15
10. Oats, coming into bloom	180	3.6	7.1	1.7	1.94
11. Timothy	300	5.4	6.1	2.3	1.94
12. Oats, in blossom	230	3.0	6.5	1.4	1.61

STRAW AND ROOTS.

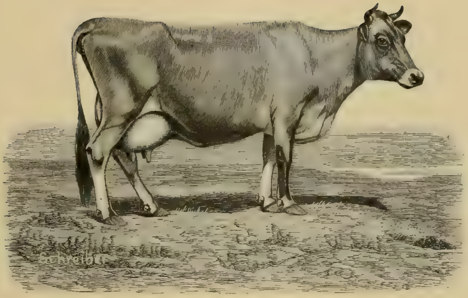
SUBSTANCES.	Dry Matter.	Nitrogen.	Potash.	Phosphoric Acid.	Manure, Value per Ton.
		18 cts.	6 cts.	10 cts.	
	Lbs.	Lbs.	Lbs.	Lbs.	
1. Oat Straw	830	5.0	10.4	2.5	$3.54
2. Barley Straw	850	5.0	9.7	2.0	3.36
3. Wheat Straw	857	4.8	5.8	2.6	2.94
4. Potatoes	250	3.4	5.6	1.8	2.55
5. Mangolds	115	1.9	3.9	0.7	1.29
6. Carrots	142	1.6	3.2	1.0	1.16

"The above tables are compiled from Professor Stewart's 'Feeding Animals.' The estimates are made for the elements of nitrogen at eighteen cents, phosphoric acid ten cents, and potash six cents a pound. This estimate is a low one, and holds good for the value when both the liquid and solid excrements are saved, and will help to give an approximate estimate of the values of manure from various fodders."

TABLE OF MANURE VALUES FROM JOSEPH HARRIS'S "TALKS ON MANURES."

In 1000 Pounds of Manure.	Nitrogen.	Potash.	Phosphoric Acid.
	Lbs.	Lbs.	Lbs.
Cow { Solid	2.9	1.0	1.7
Cow { Liquid	3.4	4.0	1.6
Horse { Solid	4.4	3.5	3.5
Horse { Liquid	15.5	15.0	
Sheep { Solid	5.5	1.5	3.1
Sheep { Liquid	19.5	22.6	0.1
Swine { Solid	6.0	2.6	4.1
Swine { Liquid	4.3	8.3	0.7
Hen	16.3	8.5	15.4
Guano	100.0	23.0	150.0

These figures are given for ordinary care of animals, where the horse gets the best all the year, and the hog rich food a part of the year. If the cow was fed as well as she ought for a full yield of milk and butter, her manure would be as rich as that of the horse.



MARJORAM 3239.

AT 12 YEARS OLD.

BRYN MAWR HERD.

F. C. SAYLES, PAWTUCKET, RHODE ISLAND.

POGIS CHIEF 3998.

Stoke Pogis—Marjoram Type.

BRYN MAWR HERD.

F. C. SAYLES, PAWTUCKET, RHODE ISLAND.

RELATIVE VALUES OF URINE.

SOURCE.	Water, per cent.	Solid Organic Matter, per cent.	Solid Inorganic Matter, per cent.
Man	96.9	2.34	0.76
Cow (not in milk)	93.0	5.00	2.00
Sheep	96.0	2.80	1.20
Horse	94.0	2.70	3.30
Pig	92.6	5.60	1.80

METHODS OF SAVING MANURE.

That there must be a radical reform in methods of treating and saving manure ought to be apparent to every man that owns an acre of ground, or is interested in the material prosperity of his country.

SOURCES OF MANURES.*

"Manure includes every substance, whether of animal, vegetable, or mineral origin, which, when applied to the soil, has the effect of increasing its fertility.

"In practical agriculture manures are divided into two classes—natural and artificial; the former being originally derived from the soil itself, in the different forms of forage, roots, plants, corn, and purchased food—all of which being consumed by cattle, yield that much-prized substance familiarly known as farmyard manure. Artificial, or, as they are sometimes termed, special or light manures, are, on the contrary, all derived from sources extraneous to the usual products of the farm—that is, they are neither directly the product of vegetable growth nor indirectly the residuum of the consumption of vegetable substances by animals. Thus guano is primarily derived from the ocean, in the fish consumed by the sea fowl, whose excrements, having accumulated on islands and rocks, furnish an almost inexhaustible supply of a manure so powerful and concentrated as to baffle all artificial attempts at imitation.

"Seaweed is another gift of the great deep, and is cast upon our shores in immense quantities by the storms and tides. The earth presents us with another class of manures, not the result of vegetable growth, but the product of great geological events: take, for instance, the limestone rocks, chalk beds, marl beds, and gypseous deposits; the coprolitic and other collections of phosphate of lime; the nitrates of soda and potash, which appear on its surface in efflorescent incrustations in some

* John Haxton, Morton's Encyclopædia.

districts of India and upper Peru ; and the sulphur from which that powerful acid, oil of vitriol, is obtained, which so greatly facilitates and economizes the effect of bones and coprolites. The commercial industries are continually adding to our supplies of manure, in the refuse substances of various manufactured articles ; thus the refuse substances of gas-works, consisting of ammoniacal water and the lime used in purifying the gas from sulphurous acid, are now largely employed as fertilizers—the former in a liquid state or the more portable form of sulphate of ammonia, and the latter, after exposure to the air, as sulphate and carbonate of lime. Our salt mines also furnish us with muriatic acid and sulphate of soda, both of which are obtained from salt by various processes in the chemical arts. The manufacture of prussiate of potash yields large quantities of animal carbon derived from the hoofs and horns employed in the process. Bone charcoal is also another refuse product of commerce, and is obtained in the form of a grayish gritty powder from sugar refiners, who employ large quantities of charred bones in clarifying the liquor of dissolved raw sugar before converting it into the whiter and purer sorts.

"Besides these sources of manure *there is one of far higher importance, in a national, sanitary, and economical point of view, than all others, not even excepting guano ; we mean the sewers of all the towns.*

"This source of fertilizing wealth has been strangely overlooked hitherto, a fact which is remarkable when contrasted with the saving and economy displayed in every department of the mechanical arts. Not a rag or shred of clothes is permitted to be lost, but is turned to some use in the making of paper ; not a scrap of rusty, malleable, or cast-iron but is carefully collected, and the one welded together into bars by the ponderous strokes of the steam-hammer, while the other is put into the furnace, whence it issues ready to be formed into any shape which the founder may desire. The gathering and collecting of the odds and ends which constitute the refuse of the useful arts are so important and profitable that they form a large trade in the country ; yet, notwithstanding the examples of success set before our capitalists and speculators by these humble departments of industry, it is only lately that the subject of applying the valuable contents of our city sewers to the purposes of agriculture has attracted anything more than cursory attention. Now, however, there appears something like a systematic attempt to turn to a useful and important purpose that which has so long run to worse than waste, and which, if economized, would not only increase the food of the country, but also render our towns more cleanly and healthful.

"In addition to the natural and artificial sources already specified, there is another class of manures to which the term artificial may be exclusively applied. They consist individually of different substances, mixed in various proportions, according to the special purposes to which they are to be applied, and according to the theoretical opinions of those who compound them.

FARMYARD MANURE.

"According to Dr. Thomson's experiments,

100 lbs. of grass consumed by a cow daily give	71 lbs. of dung.
80 lbs. of grass and 4⅓ lbs. of barley, water *ad libitum*	78 " " "
85 lbs. of grass, 5⅜ lbs. of malt, with water as before	82 " " "
25½ lbs. of hay, 10½ lbs. crushed malt	77 " " "
Average	77 lbs. of dung.

"From these figures it appears that one hundred pounds of grass, consumed indoors by a cow, produce seventy-one pounds of solid and liquid manure. But a cow also produces from twenty to twenty-five pounds of milk from one hundred pounds of grass; so that were the grass consumed by an ox instead of a cow, we would infer, from the fact of his only increasing a few pounds of live weight daily, that he would void a greater weight of dung than a cow. The quantity and composition of dung, however, are greatly dependent upon the amount of water drank along with the food; but all things being alike, it seems logical, as well as a correct physical deduction, to consider that in the case of a cow and an ox of equal size and capacity, consuming the same amount of food, the one giving a full supply of milk, and the other increasing at a maximum weight, the latter will yield the greatest quantity of manure.

"In stall-feeding the amount of manure will stand thus (for medium-sized cows):

	Tons.	Cwts.	Qts.	Lbs.
Solid dung for 210 days, 55 lbs. daily	5	3	0	24
Solid dung for 155 days, 41½ lbs. daily	2	17	1	20
Litter for 365 days, 14 lbs. daily	2	5	2	14
Urine absorbed by litter, 22½ lbs. daily	3	13	1	8½
Total solid dung	13	19	2	10½
Urine which flows into tank	7	18	0	5½
Total manure and litter	21	17	2	16

"Estimating the gallon of urine to weigh ten pounds, the whole quantity collected in the tank will amount to seventeen hundred and seventy gallons yearly. According to Sprengel's analysis of cow's urine, this quantity would contain three hundred and thirteen pounds of ammonia, besides other substances of a valuable nature also.

"Under the ordinary system of managing dairy cows the foregoing statements will not harmonize with general experience.

"We scarcely require any chemistry to teach us that the quality of dung voided by any description of fattening stock or milch cows is the difference between the food consumed and that portion of it retained in their bodies, as flesh, fat, etc., or withdrawn in the milk, perspiration, respiration; or, in other words, the dung is the food, minus the flesh, fat, milk, and insensible waste through the lungs and skin. The dung is, therefore, inferior to the food in a fertilizing point of view, just in proportion to the substances extracted from the latter by animals.

MANAGEMENT OF MANURE.

"This may be said without exaggeration to be the most important department of farm practice, and unfortunately one in which there is greater need of improvement than any other. Notwithstanding the fact that the proper management of the manure heap has been explained and enforced by the teachings of agricultural chemistry year after year, the practical application of the lesson remains in a great measure to be made.

"Farmyard manure, as heretofore, continues to be carted out from rain-soaked straw-yards to the distant fields, and there deposited in large, ill-formed heaps, exposed to rain, wind, and sun for weeks and months.

"Many farmers whose practice otherwise is unassailable are yet strangely blinded to the great loss sustained by exposed manure heaps. On the great majority of farms, even in the best-farmed districts, there is a fearful waste of food-producing material.

"Badly constructed homesteads have, no doubt, greatly contributed to this state of things, and it is very seldom that any provision is made, in the construction of new ones, for the preservation of liquid manure or for protecting the straw-yard from being deluged by rain poured into it from the surrounding roofs.

"A loss of manure is equivalent to a diminution of produce, and this again, by lowering the profits of farming, necessarily depreciates the value of land. All manure should be made under cover, either in stalls, boxes, or sheds; if in the former, it must be removed daily, so that a covered shed will be necessary for its protection; if in the second, it may be allowed to accumulate for two or three months; and by the latter mode it may remain until required for laying on the land, provided height of the roof will admit of its being accumulated. How is it that we invariably find box-feeding or house-feeding of some kind or other always accompanied by bulky crops of corn, roots, and clover? Just because the manure so made is richer and more abundant than on those farms where the horse-pond receives the drainage of the courts and byres.

"We need only point to what has been already said in regard to the quantity of urine voided by animals to prove that if there be no tank to receive the drainings of

stall-fed animals, the loss sustained will amount to one third the weight of the whole dung, or twice that of the liquid part. Few who have not studied this subject are aware of the enormous quantity of fertilizing materials that accompanies the little black stream that oozes from a straw-yard where there is no tank to drain off the surplus liquid.

MANURE HEAPS.

"There being few steadings where the accommodation is sufficient to hold all the manure until wanted for application to the land, it is necessary and particularly convenient to cart it out to the more distant fields, and to make it up in large heaps.

"Wherever this is necessary, the cart should be driven upon the heap before being emptied.

"By so doing, manure is consolidated, air is excluded, and fermentation prevented.

"In finishing the heap, the ends should be raised nearly on a level with the centre, which is easily done by a little attention on the part of the carter. These portions unavoidably left low at both ends for the cart to get on and off the heap can be raised on a level with the rest by backing several cartloads, tilting them up, and throwing up the manure with forks.

"After this the whole heap should be covered with earth from the sides, three or four inches thick, which should be well beaten down with a spade. Road scrapings are even better than common soil, as they are in a very minute state of subdivision, besides always containing a considerable quantity of manure dropped on the roads.

"If these are sufficiently wet to beat into a plaster on the heap, so much the better, as the surface will thereby be more hermetically sealed, both within and without. In addition to all this the whole surface may very profitably be sprinkled with sulphuric acid, so that any ammoniacal gas escaping may be at once arrested by this useful agricultural detective, whose affinity for fugitive alkalies is altogether insatiable. Dissolved bones, having a free acid, may also be employed for fixing ammonia; and if the manure be intended for turnips or mangolds, it is an excellent plan to mix a few hundred weight through the whole heap.

"An excavated site, built on three sides, with a wall four feet high, is the best mode of preserving manure in a field; there would be no risk of loss from evaporation or fermentation, provided the top and open side were covered with earth.

APPLICATION OF MANURE TO THE SOIL.

"The quicker farmyard manure is buried, the better. This is a maxim that holds good everywhere, and under every circumstance; because, when once covered up by

three or four inches of earth, it is safe from all risk of being lost, as the soil has both a physical and chemical power of retaining ammonia, while, at the same time, it yields it up readily to the growing plants. The wasteful practice of spreading manure on the surface of the soil, and allowing it to lie bleaching for weeks, and even months, before being plowed in, is still carried on and stoutly defended by hosts of clay-land farmers.

"If the perpetrators of such an enormity be right, science is at fault, analysis is a delusion, and ammonia and all its kindred a family of impostors.

"The practice in Syria of making the dung into cakes and sticking these upon the walls of their houses to dry in the sun, preparatory to their ultimate destination of being burnt as fuel, is not much more wasteful than spreading out farm-yard manure to the winds, rains, and sun for months together.

"A farmer who imports ammonia from the Chincha Islands and dissipates to the winds that furnished by his own farm, is nearly as wasteful as he would be were he to give away his straw for nothing, and to purchase from others what he required for his own use."

Ash Heap.*

"There is a source of valuable and extremely useful manure on every farm, of which very few farmers avail themselves—the gathering together in one spot of all combustible waste and rubbish, the clippings of hedges, scouring of ditches, grassy accumulation on the sides of roads and fences, combined with a good deal of earth. If these are carted at leisure times into a large circle, or in two rows, to supply the fire kindled in the centre, in a spot frequented by the farm laborers, with a three-pronged fork and shovel attendant, and each passer-by is encouraged to add to the pile whenever he sees the smoke passing away so freely as to indicate rapid combustion, a very large quantity of ashes are collected between March and October. In the latter month the fire may go out; the ashes are then thrown into a long ridge, as high as they will stand, and thatched while dry. This will be found an invaluable store in April, May, and June, capable of supplying from twenty to forty bushels of ashes per acre, according to the care and industry of the collector, to drill with the seeds of the root crop. It is a good practice to dissolve bones with acid in the beginning of February, and when reduced to a pulp to mix them up with the ashes in a large heap, which should be turned over two or three times at intervals, and the bone paste well reduced with the shovel, and thoroughly mixed at each turning; by the month of May a homogeneous compound will be formed that will run freely and evenly through the drill, and form an inviting bed for the seed."

* C. Lawrence, Morton's Encyclopædia.

Restoration of Soils.*

"The two principal means of restoring the fertility of a soil which has been diminished by the continued cropping, are: (1) The mechanical improvement of the soil. (2) The application of manure.

"All plants take away from the soil a certain quantity of mineral matters which are essential to their existence. Some plants require more phosphoric acid than others, which want a greater supply of potash for a healthy growth; some again require for their perfection much lime, others silica; but all take up a number of inorganic chemical substances, which the plant can have derived only from the soil on which it was grown. If it is true that these mineral elements are essential to the very constitution of all plants—and there can be no doubt in reference to the function of the inorganic matters of the soil—it follows that sooner or later the most fertile soil must become exhausted to such an extent that it will no longer produce remunerative crops. Experience has long ago proved this, and at the same time pointed out two ways which are pre-eminently calculated to restore the native fertility of a soil deteriorated by long-continued cropping.

"The first includes all those practical operations, such as digging, plowing, rolling, whereby the physical structure of a soil is improved, or its latent fertilizing properties developed by strictly mechanical means.

"The second consists in the application of manures. In all countries where agriculture is practised as an advancing art, the application of manures, together with their preparation and economy, are justly regarded as the most valuable and indispensable means of an improved system of farming. Hence, the great importance which attaches to the subject of manures in general; to the theory of their action and their rational application; to the best modes of preserving and increasing the fertilizing value of farm-yard manure, and to the methods which are pointed out from time to time of saving many natural products, which are still in so many instances allowed to run to waste; or to the means of converting comparatively valueless articles into fertilizers. It is for these and similar reasons that the subject of manures has been treated in this work at great length.

"Whatever acts as a fertilizer, which is brought to the land, may be termed a manure.

"Clay, lime, marl, water, air, and even sand, accordingly come under the denomination of manures, just as well as dung, urine, and guano. It is quite true the beneficial effects resulting from the application of clay, marl, lime, sand, and many other compounds are realized chiefly in the altered physical condition of soils to which the above substances have been applied. In many cases they do not act so

* Prof. Voelcker, Morton's Encyclopædia.

much by supplying direct nourishment to the plants as by indirectly facilitating the absorption of the hidden treasures, which, being present in a dormant state in a soil, are thereby rendered available for the use of plants.

"We shall include *all* materials which are added to the soil for the purpose of increasing its productive power under the name of *manure*. A normal manure will be such only as shall furnish to the growing plant all the elements of food which the plant requires for the formation of its roots, stem, leaves, and fruit.

"A rational application of manures to the land is dependent on several circumstances; and we can entertain the hope of manuring our fields in the most successful and economical manner only when the following four points shall have been determined accurately:

"1. The wants of the plants intended to be cultivated in reference to the elements of nutrition.

"2. The wants of plants in reference to the physical condition of the soil.

"3. The composition of the soil.

"4. The composition of the manure.

"The organic portion of which the great mass of all cultivated plants is made up is derived principally from the atmosphere; whereas the inorganic part of plants, remaining behind in the form of ashes when a plant is burnt, can be supplied only by the soil or the manure.

CONSTITUENTS OF MANURES.

"1. *Nitrogen, in the form of Ammonia or Nitric Acid.*—Nitrogen is one of the most important of all fertilizing substances; it must be considered as the most valuable, in so far as its commercial price is taken as the test in estimating its value. It is, however, useful to the luxuriant growth of our cultivated plants only in one of the above forms; for in a free state it is not assimilated by plants to any extent, nor does the nitrogen of organic bodies become available to plants before the nitrogenized matters have undergone a change by fermentation or putrefaction, the result of which change, among other products, is the formation of ammonia or nitric acid. Nitrogen in either of these two forms exercises a most powerful action in manure, particularly when applied to plants at an early stage of their growth; at a later period of development the application of ammonia or nitric acid appears much less effective, and sometimes even useless. The rapid forcing effects of ammonia, of the ammoniacal liquor of gas-works, of sal-ammoniac, and ammoniacal salts in general, are too well known generally to require reference to the direct numerous practical field experiments which have been made in order to ascertain the efficacy of ammonia as a fertilizer. It will scarcely be necessary to allude to the presence of ammonia in guano, soot, etc., as being one of the causes of the forcing properties

which characterize these and other fertilizers. The beneficial effects of ammonia and its salts have been occasionally denied, because the materials containing these fertilizing agents have been improperly used.

"As a general rule, ammonia or its salts should never be used on the farm in a concentrated form. Their caustic properties necessitate their application in a diluted state.

"Every practical man is acquainted with the burning effect of strong liquid manure or the ammoniacal water of gas-works, and therefore never applies the first to his land in dry weather, or the latter, except diluted with much water, or mixed with other substances.

"It has been observed that the nitrogen of matters, such as flesh, bones, hair, and horn-shavings, benefits vegetation only in so far as it becomes changed into ammonia. When these substances putrefy, ammonia is generated in large quantities, and it is principally for these reasons that they act as fertilizers. In a fresh state they are almost entirely useless, but they are rendered the more powerful in their action the further their decomposition has proceeded. Fresh bones, hair-refuse, wool-refuse, unfermented urine, long dung, are much slower in their action than the same materials after having undergone fermentation or putrefaction. In the latter state they contain ammonia ready formed, which the plant can assimilate at once; but in the first case the decomposition of the nitrogenized matter proceeds slowly in the ground, particularly when plowed in deep; and the plants are thus made to wait a long time before they can absorb the ammonia, which is generated during the decomposition of the nitrogenized organic matters. In stiff soils, and in dry seasons, the formation of ammonia proceeds so slowly that the beneficial action of manuring substances is frequently lost in the first year, because if plants have passed the period of their most vigorous growth they derive very little advantage from the ammonia.

"Therefore wool-refuse, bones, and other fertilizers, the action of which depends on the ammonia which is gradually formed on their decomposition, ought never to be applied in spring, when it is intended to benefit the first crop by such application, but at least three or four months, and in many cases even longer, before the crop is sown. On the other hand, manuring substances, such as guano, soot, refuse-water of gas-works, sal-ammoniac, sulphate of ammonia, putrefied liquid manure, which all contain large quantities of ready-formed ammonia, exercise a surprisingly quickening power on grass land, wheat, and all plants at an early stage of their growth.

"The value of ammonia and its salts in manuring substances has been greatly underestimated by Liebig and his followers, who believe with him that there is no necessity for supplying plants with manures containing ammonia, because plenty of it is afforded to them for assimilation by the air. Now, although it cannot be denied

that plants absorb the ammonia of the air, and that the air presents to them an almost inexhaustible source, from which they may derive ammonia, it is nevertheless true that this property of absorbing and elaborating the atmospheric ammonia in sufficiently large quantities is shared by comparatively few plants. To most vegetable productions the supply of ammonia from that source proves insufficient; and as we know practically that almost all our cultivated plants are dependent on other sources, from which they can derive nitrogen, and as ammonia and its salts decidedly improve their condition, it would be unreasonable not to attach any value to the presence of these fertilizing materials in the different articles used as manures. In the form of nitric acid, nitrogen becomes also a most valuable manure, and in this state it closely resembles ammonia in its action. The effects of nitrate of soda, for instance, on grass land are strikingly exhibited by the succulent, luxuriant appearance and the deep green color which the grass assumes shortly after its application. Even small quantities of the alkaline nitrates exercise a most surprisingly quick forcing action on grass lands; and it is undoubtedly the case that cattle prefer grass to which top-dressing of nitrate of soda has been applied to grass grown without the intervention of that fertilizer.

"2. *Organic Substances, Humus.*—Organic matters, consisting of carbon, hydrogen, and oxygen only, are present in farm-yard manure and many other fertilizers in large quantities; but their importance as fertilizing agents is not to be compared with that of the nitrogenized organic matters, ammoniacal salts, or nitrates.

"Formerly the value of a manure was estimated according to the proportion of organic matters it contained; the chief fertilizing effects were thus referred to the presence of organic substances, which, on decomposition, furnished humus, the substance which for a long time was regarded as the only material from which plants derived any direct food. The value of the organic or humus-forming matters in manures, accordingly, was overestimated by former physiologists and agriculturists, until the researches of Liebig have placed it in a clear light that the effects produced by the organic portion of manures in comparison with those of their inorganic matters are so trifling that he disregards the organic substances in manures entirely. Although we do not agree with this view of the subject entirely—a view, it may here be observed, lately modified by Liebig himself—we still hold the opinion of those to be correct who regard the *inorganic matters* of manures as the chief fertilizing agents.

"In one important point, however, we must differ from the strict adherents of the mineral theory—namely, in attaching a much greater value to the nitrogenized organic matters than is done by Liebig and his followers. A little consideration will show the comparative insignificance of the humus-forming substances in relation to the nutrition of plants. In the first place, the insufficiency of humus to supply plants with organic food can be demonstrated by an easy calculation; for if we

estimate the weight of the organic matters removed in a crop from the soil, and the amount of humus supplied by the manure, we shall find that a small proportion of the first can have been derived from the humus of the manure, even if we estimate the whole of the latter as having passed into the substance of the crop. We know, secondly, by direct experiments, that the great bulk of all plants is derived from the carbonic acid of the atmosphere, which presents plants with an inexhaustible source from which they may draw organic nourishment.

"A practical confirmation of this fact we find, thirdly, in the abundant crops of Indian corn which are raised in Mexico and Peru on soils destitute of all humus, without the application of any organic manure, as well as in the fertility of irrigated meadows, which likewise do not receive any organic manures. It is for these reasons that we do not attach to the non-nitrogenized organic matters the same importance as to the inorganic, which the plants can derive only from the soil or the manures.

"So far as the direct supply of food to plants is concerned, we are thus inclined to consider the importance of the organic matters of manures as insignificant in comparison with that of their inorganic substances. Indirectly, however, organic manures play an important part in relation to the growth of plants, inasmuch as, by their application, the physical condition of soils is materially improved. This function of the humus-forming substances in manures must not be overlooked. They are further useful to vegetation, because they absorb both moisture and ammonia from the atmosphere with great avidity, thus becoming indirectly suppliers of food; and because, on decomposition, they themselves furnish carbonic acid.

"While we ascribe the chief value of the non-nitrogenized organic matters to the alteration in the physical condition of the soil which they effect, and to the indirect food which they furnish to plants, their use as direct suppliers of food cannot be altogether denied, if dependence can be placed on Soubeiran's experiments, made in reference to the absorption of soluble salts of ulmic acid by plants. From these experiments Soubeiran concluded that ulmate of ammonia was taken up by plants; and Mr. Malaguti has confirmed and extended this observation by quantitative analysis.

"3. By far the most valuable *inorganic* constituent of manures is *phosphoric acid*, as it is a substance without which the grain of our cereals cannot come to perfection. Its deficiency in the soil is generally indicated by the poor, thin appearance of the ears of wheat, barley, or oats. Phosphoric acid rarely occurs in soils in sufficient quantities to equal the demands of the crops, and has therefore to be supplied in the form of manures. The beneficial action of bone-dust, superphosphate, coprolites, must be referred chiefly to the phosphoric acid which these fertilizers contain.

"In the same combination in which phosphoric acid is found in bones—that is, in the form of bone-earth or phosphate of lime—it occurs in the solid excrements of

all domestic animals; it consequently constitutes an important ingredient of farm-yard manure, and of all artificial manures which are applied with advantage to the growth of grain and root crops. It is worthy of observation that phosphate of lime, although insoluble by itself in water, is rendered soluble by the addition of a small quantity of ammonia to the water.

"This property of phosphate of lime agrees well with practical experience, which tells us that phosphate of lime, or phosphates in general, exhibit the most energetic effects on vegetation when they are mixed with ammoniacal salts or nitrogenized organic matters, which furnish ammonia on decomposition.

"For the same reason, the most powerful manures will be found those which contain much phosphoric acid and ammoniacal salts, or nitrogenized organic matter.

"4. *Alkalies, Potash, and Soda.*—Potash and soda, particularly the former, are valuable component parts of farm-yard manure, and of all the better artificial fertilizers.

"Although potash and soda belong to the more widely diffused inorganic substances on the earth, their quantity in most soils is too small to justify us in neglecting the direct supply of salts of potash in some way or other. The solid excrements of horses, cows, sheep, and pigs contain but small quantities of salts of potash, which, being very soluble in water, are chiefly separated with the liquid excrements, or the urine of our domestic animals. *The preservation of their urine thus becomes a duty imperative on all farmers*, because they will otherwise lose all the advantages of the highly fertilizing salts of potash. In its chemical relation potash resembles ammonia closely, and the same is the case with the salts of potash and ammonia. In their effects on vegetation this similarity is observed; for potash and its salts exercise the same stimulating or forcing action which we have seen is characteristic of ammonia.

"In manures potash occurs partly in combination with chlorine, as chloride of potash, partly in combination with sulphuric and silicic acid, as sulphate and silicate of potash.

"In the urine of carnivorous animals phosphate of potash also is found.

"All cultivated plants, particularly root crops and herbaceous plants, require potash as a necessary article of food, for their ashes contain large quantities of it. The chief reason of the beneficial effects produced by the application of wood ashes, liquid manure, and many natural silicates is, undoubtedly, the greater or smaller quantity of salts of potash which these kinds of manures contain. The principal cause of the fertilizing effects of burnt clay is to be referred also to the soluble potash, which in burnt clay exists in a larger proportion than in the same clay in its natural state. On burning the insoluble alkaline silicates occurring in clay are in a great measure decomposed, and potash is thus rendered soluble. The beneficial effects produced by the application of quicklime on some lands is also due to the

liberation of potash in the soil, which previously existed in an insoluble state. Silicate of potash, which is found in farm-yard manure and other fertilizing mixtures, is a very valuable compound, which appears to exercise a beneficial action, particularly on grain crops. Much less effective than potash salts are the salts of soda, of which the more frequently recurring are chloride of sodium and the sulphate and silicate of soda. Generally speaking, the proportion of salts of soda in manures is larger than that of the salts of potash. There are few soils which do not contain naturally so much soda in one form or the other as to satisfy the wants of the crops which are raised upon them. It is for this reason that the value of soda salts as fertilizers is very much less than that of potash salts. It is so inconsiderable, that we need not care to supply the salts of soda by artificial means to the land. The localities where common salt proves most effective are inland places, far removed from the sea; and in such places beneficial effects following its application are intelligible. In the ashes of plants potash occurs almost always in larger quantities than soda, and this affords another proof of the greater value of the former.

"Nitrate of soda, which exercises a most decided and surprisingly quick forcing action on grass land, owes its efficacy principally, we believe, to nitric acid, and not to soda.

"5. *Lime and Magnesia.*—Almost all manures contain lime and magnesia, which are indispensable for the healthy growth of plants. Farm-yard manure contains lime partly in the state of carbonate, partly as sulphate of lime. The latter compound, or gypsum, is a fertilizer, which frequently constitutes the chief component part of several artificial fertilizers, which have been mentioned; the better sorts of manures do not, or ought not, to contain too large an amount of gypsum.

"Lime and magnesia are among the most widely distributed mineral substances, and can be very economically added to soils in which a deficiency may have been found, in the form of gypsum, marl, quicklime, gaslime, limestone, chalk. As constituents of manures, lime and magnesia are not very important.

"6. *Silica.*—All ashes of plants contain silica; some, as the ashes of straw, of wheat, barley, a very considerable proportion. Silica, for this reason, is an essential article of food to plants, without which many could not come to perfection. However, it is in but few cases that the farmer need care to apply silica to the soil, because most soils contain a large excess of it already. The only state in which silica can be taken up is in the soluble form, and it is in this soluble state that silica occurs in the solid excrements of animals. These are rich in soluble silica, and therefore particularly well adapted to soils deficient in this element.

"Silica, even in a soluble form, is far less important than any of the substances previously mentioned.

"7. Sulphuric acid, chlorine, fluorine, oxides of iron and manganese, and sometimes alumina, are also constituents of many manures; but as these compounds are so generally distributed throughout nature, we find few soils which do not contain as

much of them as is required to the healthy growth of plants. Their value as constituents of manures can, therefore, with propriety be altogether overlooked.

"These, then, are the constituents which ought all to be present in a universal manure, and which are present in farm-yard manure.

"In order to avoid misunderstanding, we would observe that when speaking of the different values of manures, we refer to their *commercial value*. In one sense all substances which are found in the ashes of plants are valuable, as they are *essential* to the perfection of plants, and in this sense lime or silica is just as valuable as potash or phosphoric acid, because the largest supply of the latter substances would not prevent the plants languishing for want of the former.

"Referring, then, to the commercial value of the fertilizing constituents of manure, it will appear from the above observations that they range in the following order:

"1. Nitrogen or, rather, ammonia and nitric acid.

"2. Phosphoric acid.

"3. Potash.

"4. Lime and magnesia.

"5. Soluble silica.

"6. Humus-forming organic matters.

"7. Sulphuric acid, chlorine, oxide of iron.

"Nitrogen, in the form of ammonia, ammoniacal salts, nitric acid, nitrates, or nitrogenized organic matters, is the most valuable ingredient of manures, because the mineral matters of manure show their full fertilizing effects only when decaying nitrogenized matters or salts of ammonia are present at the same time.

"Next in value follow phosphoric acid and potash, as both belong to the rarest of the mineral matters which serve as food for plants, and as both are required for their healthy growth in larger quantities than any of the other constituents which are usually found in the ashes of plants.

"The high value of nitrogen in manures has been fully recognized by Boussingault and Payen, who determined the quantity of nitrogen in a great many substances used as manures. These nitrogen determinations were used by them as the basis for calculating the principal relative fertilizing effects of different manures. In the second edition of Boussingault's 'Economie Rurale' he enlarges the general utility of the former table by adding to it another column, in which the equivalent weights are determined in relation to the quantity of phosphoric acid which they contain. In the subjoined table farm-yard manure is taken as the standard of comparison, and its equivalent is assumed to be 100.

"Thus, 250.0 pounds of wheat straw are equal in fertilizing effects to 100.0 pounds of common farm-yard manure, as far as the *nitrogen* is concerned; but with respect to the fertilizing effects of the *phosphoric acid* 266.7 pounds of wheat straw are equal to 100.0 pounds of common farm-yard manure."

EXTRACT FROM TABLE REPRESENTING THE COMPARATIVE VALUE OF DIFFERENT MANURING SUBSTANCES.

SUBSTANCE.	Water, per cent.	Nitrogen, per cent. Natural State.	Phosphoric Acid, per cent. Dry.	Equivalents derived from per cent. of Nitrogen. Natural State.	Equivalents derived from per cent. of Phosphoric Acid. Natural State.	OBSERVATIONS.
Farm-yard Manure......	65.0	0.63	2.25	....	.....	England.
Mixed Manure.........	66.7	0.60	1.45	100.0	100.0	Farm-yard manure.
Wheat Straw...........	19.3	0.24	0.22	250.0	266.7	Alsace.
Oat Straw.............	21.0	0.28	0.21	214.2	300.0	Alsace.
Rye Straw.............	12.2	0.17	0.15	352.9	369.2	Alsace.
Carrot Leaves..........	70.0	0.85	....	70.6	.....	Green in autumn.
Clover Roots...........	9.7	1.61	....	37.3	.....	Air-dried.
Seaweed...............	39.2	0.86	...	69.8	160.0	Air-dried.
Fir Sawdust...........	24.0	0.23	....	260.9	2400.0	
Oak Sawdust...........	26.0	0.54	....	111.1	1600.0	
Cow Dung............	85.9	0.32	....	187.5	480.0	Solid excrements.
Cow Urine.............	88.3	0.44	....	136.4	.....	
Excrements of Cow.....	84.3	0.41	0.55	146.3	533.3	Solid and liquid excrements.
Horse Urine...........	79.1	2.61	....	22.9	.....	Concentrated urine.
Horse Excrements......	75.4	0.74	1.12	81.1	178.9	Solid and liquid excrements.
Pig's Excrements.......	93.8	0.37	3.44	162.2	228.6	Solid and liquid excrements.
Sheep's Excrements.....	67.1	0.91	1.32	65.9	111.6	Solid and liquid excrements.
Human Urine..........	93.3	1.45	3.88	41.4	184.6	Berzelius.
Human Excrements.....	91.0	1.33	2.85	45.1	189.6	Solid and liquid excrements.
Unboiled Bones........	8.0	6.22	22.20	9.6	2.3	Containing ten per cent. of fat.
Peruvian Guano........	25.6	5.52	20.00	10.9	3.2	Denham Smith.
African Guano.........	25.0	6.19	17.00	9.7	3.8	Kasten.
Wood Soot............	5.6	1.15	1.00	52.2	51.1	
Oyster Shells...........	17.9	0.32	0.65	187.5	90.6	
Marl..................	1.0	0.51	....	117.6	.....	
Seashore Sand..........	0.5	0.13	....	461.5	.....	

NATURAL MANURES.

"The atmospheric air may be regarded as the great storehouse which provides plants with organic food. It presents an inexhaustible source of carbonic acid, which is principally assimilated by the leaves of plants, and elaborated by them into starch, sugar, cellular tissue, etc. The great bulk of all plants, whether entering them by the leaves or the roots, owes its origin to this natural manure.

"Besides carbon, the air supplies plants with ammonia and with moisture. Though small in quantity, the ammonia is a very important constituent of the air, in reference to the nutrition of plants.

"During thunder-storms nitric acid, which unites with the ammonia, is also formed, and as nitrate of ammonia is a very soluble and highly forcing manuring substance, we can explain in some measure the fresh appearance of our fields after a thunder-storm. The moisture contained in the air in an invisible state provides plants with more water than the rain which falls upon the land.

"Rain-water, the purest natural water, is perhaps the most important of all natural manures, as without it vegetable as well as animal life would become impossible.

"Spring waters owe the additional effects which many exhibit, in comparison with pure or distilled water, to the presence of mineral or inorganic matters. Salts of lime, potash and soda, which occur in some waters, render them well adapted for irrigation.

"Some natural waters contain phosphoric acid, which are used with great advantage for irrigating meadows.

"The muddy deposits near the mouths of some rivers may also be called natural manures; the deposits belong to the most valuable fertilizers, and have converted a great part of the very sterile sands of Holland and Belgium into rich garden land.

QUALITY OF FARM-YARD MANURES.

"The quality and quantity of farm-yard manures are affected,

"1. By the quantity of food upon which the animal is fed.

"2. By the quality of the food.

"3. By the amount of water in ration and water drank.

"4. By the age of the animal. Richer in mature animals.

"5. By the purpose for which the animal is used, being increased by fattening and diminished by milk or work.

"6. By the treatment of animals, comfort increasing and hardship diminishing manure.

"7. By the quantity and quality of the litter.

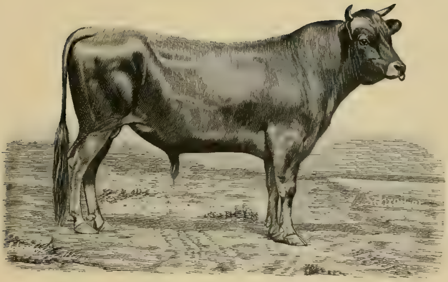
MATIN 7768.

AT 8 YEARS OLD.

Brown Prince Type.

BILLINGS HERD.

FREDERICK BILLINGS, WOODSTOCK, VERMONT.



MATIN'S GLORY 9135.

AT 2 YEARS OLD.

Matin—Lille Bonne—Favorite Type.

Average Tests of Dam and Grandams, 17 lbs. 13¾ oz.

BILLINGS HERD.

FREDERICK BILLINGS, WOODSTOCK, VERMONT.

"8. By the length of time the manure is kept, and the method by which it is preserved.

QUANTITY OF EXCREMENT VOIDED BY ANIMALS.

Animal.	Solid Excrements.	Urine.
A cow furnishes annually	20,000 lbs.	8,000 lbs.
A horse furnishes annually	12,000 "	3,000 "
A pig furnishes annually	1,800 "	1,200 "
A sheep furnishes annually	760 "	380 "

LIQUID MANURE.

"Neither the solid nor the liquid excrements, applied separately, constitute a universal manure, or a manure which can be used for the raising of all kinds of crops; liquid manure can never supersede the use of the solid, well-prepared farm-yard manure, if care is not taken to dissolve in it those substances which enter into the composition of the solid excrements of animals. In Flanders and some parts of Holland a most powerful liquid fertilizer is obtained by dissolving and distributing the excrements of animals in the liquid.

"During the fermentation of the liquid the solid matters are for the greater part dissolved, or at all events reduced to a fine mud, which remains easily suspended in the water.

"For the cultivation of flax, beets, and green crops in general such a liquid manure is preferred in Flanders to any other, as it has been found, by long experience, that in the liquid state the excrements of animals are best employed for the growth of these crops. The Flemish farmers accordingly bestow great care upon its preparation, and carefully collect the urine of the stables, which is conducted through drains into separate liquid manure tanks, into which all the drainings of the dung-heap are allowed to flow. In Belgium the urine and solid human excrements are not wasted, as with us. Before its application to the land this liquid manure must first be diluted with much water, as it is so strong that it would burn up and completely destroy the young plants, if the precaution were not taken to dilute the liquid, according to its strength, with three to six times its bulk of water.

"Even so diluted, it is advisable to apply it to the land in wet weather or when the soil is soaked with moisture, because in dry weather the manure is likely to exercise a burning action on vegetation. It appears incredible to continental farmers that our farmers should prefer willingly to pay heavy sums for the imported

guano and other artificial manures, while neglecting to reap the benefit from those fertilizers which present themselves at our own doors.

"The urine of animals possesses greater value than the solid dung, and is subject to great loss if not properly treated. The loss of this valuable fertilizer, by evaporation of ammonia, will be greater in hot than in cold weather, in open than in covered places. Hence, the use of covered liquid-manure tanks and the disadvantage of shallow pits exposed to wind and sun. Next to the collection of the liquid excrements of animals, the preservation of its volatile constituents ought to be attended to by every good farmer.

TO PREVENT LOSS OF AMMONIA.

"Sulphuric acid and sulphate of iron, when they can be had at a cheap rate, are by far the most efficient materials for preventing the evaporation of ammonia. On the average, one pound of oil of vitriol will be sufficient for one hundred and fifty pounds of liquid manure. The acid should first be diluted with water before it is poured into the liquid manure tank."

Sewage Manure.*

"*What is sewage?* In it the chemist recognizes rounds of beef and basins of turtle; cargoes of sugar, coffee, and port wine; millions of loaves of bread and thousands of tons of cheese and butter. Therein are not only all the alimentary productions of our own country, but also our enormous alimentary imports, altered in form, but scarcely in utility or value. It is truly a well-known but unworked mine of gold.

"We might call it a stream of liquid guano. It exists in a form of peculiar availability and almost self-portability; its fertilizing powers are enormous. We may estimate its value by the sums expended to compensate for its loss. We pay for guano, oil-cake, and corn many millions, and vast sums are annually abstracted from the agricultural pocket for phosphates and other artificial manures.

"Nationally, this neglect of sewage is a great calamity, but one that, it is to be hoped, may receive a gradual and wholesome correction.

"If it is considered ruinous by the farmer to waste the excrementitious deposits of his animals, with still greater force does the objection apply to the waste of our sewage.

"Experience has taught the writer of this article that there is no material practical difficulty to overcome in its economy and appliance to the soil as a fertilizing agent.

* Extracts from article of J. J. Mechi, Morton's Encyclopædia of Agriculture.

"It is not more difficult to convey than the water which intersects our streets, and finds its way into every house. It may, in fact, be considered the venous return of an arterial circulation; and the more abundant its liquefaction, the more valuable it becomes, seeing that water alone contains all the organic elements of our food. It is hardly possible to treat this subject except as a joint question of sewage and irrigation with drainage, artificial or natural.

"We said there was no practical difficulty in economizing this most valuable commodity, excepting the all-important one that public opinion has not yet appreciated its value.

"The force of public opinion must be brought to bear on this great question.

"Teach the farmer that it is liquid guano, brought to his door in its only available form; let him understand that the water of solution is, independently, a means of fructification; point out to him that every valued meadow whose rich crop of hay he covets owes its powers of production principally to the abundant supply of moisture.

"It is a question for our legislators and the country at large.

"When once convinced of its value, recorded registers of supply will be attached to each farm, like our gasometers. Quarterly demands for its use will be cheerfully paid; our towns will be cleansed and our country fertilized. The evidence on this subject is too abundant and distinct to be doubted or denied. It is collated in a document issued by the General Board of Health, Whitehall, London, entitled, 'Minutes of Information Collected on the Practical Application of Sewage Water and Town Manures to Agricultural Production.' The copious instances of cost and return there exemplified induced the writer of this to carry out the system on a farm of one hundred and seventy acres; and an experience of one year has sufficed to convince him of its easy practicability and great pecuniary advantages; he finds it, in fact, the key to profitable farming.

"The evidences are all sufficiently clear that the mere water irrigation of land on this principle of subterranean pipeage is remunerative. How much more so, then, when saturated with the elements of our food!

"The necessity for irrigation is becoming annually more apparent. The extensive removal of woods, fences, and the general clearing and improved cultivation of our country, added to the daily increasing drainage, render our soil and our climate warmer and drier, and consequently less favorable to succulent productions. By the proposed system of irrigation we shall have a warm moisture for our roots and green crops and dryness for our cereals; in fact, a desirable combination of food in abundance for man and for beast.

"Sewage, or liquefied manuring, renders the root and green crops self-supporting, by furnishing a great increase at a diminished cost. It may be compared to growing the ordinary produce of one hundred acres on fifty acres, thus diminishing

by fifty per cent. taxes, horse and manual labor, wear and tear of implements, roads, gates, etc. In many instances, as in those of poor grass lands, the writer has no hesitation in saying that the produce would be doubled and greatly improved in feeding quality.

"The facility and promptitude with which a barren soil may be fertilized is surprising. In lands drained naturally or artificially, the writer has seen cabbages and roots luxuriate in a miserable plastic clay brought from the subsoil immediately after its saturation with sewage or liquefied manure. Its effects are alike beneficial to every crop—cereal, bulbous, or leguminous; although, in the case of cereals, a due regard is required as to the necessity for its application and a judicious regulation of the quantity of seed.

"With regard to the form of application, the writer's experience confirms the evidence collated, that the hose and jet present very great advantages in every respect.

"As to the period of growth, or season for application, the writer has applied it at almost every stage: in sunshine and wet; in winter and summer; on fallows in wet weather very strong, in dry weather more amply diluted. During the heats of summer its frequent application to bulbous, leguminous, and green crops is attended with the most profitable results, illustrating, in degree, the rapid vegetation produced by great heat and moisture in tropical climates. With an increasing population, the time is fast approaching when the concentration of capital on land for a greatly increased production will become a necessity. In lieu of two acres producing barely enough for one cow, six sheep, or one bullock, by these means from three to five cattle, or twenty sheep, may be maintained on one acre. In extreme cases enormous results have been produced. The meadows near Edinburgh, some of them once arid and worthless, have, by being flooded with the sewage of that city, risen to an enormous value, and are annually let by public auction at prices varying from £15 to £32 per acre. It is estimated that the quantity of green food cut annually from each acre is from fifty to eighty tons.

"The supply of milk to our great cities would, by similar irrigations, become greatly improved in quantity, quality, and price.

"One of the most important results is the destruction, or driving away, of injurious grubs or insects. Wire-worm, slug, and beetle either perish under the jet, or quickly leave the field. Clovers do not fail, and roots are freed from knobs and fingers and toes."

There is no subject connected with agriculture so generally attracting attention as that of fertilizers, especially the avoidance of waste, so common upon farms, and the utilizing of the sewage of cities. Much attention has been given to the practical investigation of the saving of liquid manure in Great Britain, but the problem is still considered a matter of experiment, because of the great cost of receptacles and

apparatus for application to the soil. There is no question of its great value and the advantageous form for promoting rapid plant growth.

I quote from the Encyclopædia Britannica a part of an article that appeared originally in "Minutes of Information," issued by the General Board of Health, detailing the Scotch method:

"The next place visited was the farm of Myremill, near Maybole, in Ayrshire, the property of Mr. Kennedy, who adopted and improved on the method of distribution just described. On this farm, about four hundred imperial acres of which are laid down with pipes, some of the solid as well as the liquid manure has been applied by these means, guano and superphosphate of lime having been thus transmitted in solution, whereby their value is considerably enhanced. This is especially the case with guano, the use of which is thus rendered in great measure independent of the uncertainties of climate, and it is made capable of being applied with equal advantage in dry and wet weather. In some respects the farm labors under peculiar disadvantages, as water for the purpose of diluting the liquid has to be raised from a depth of seventy feet and from a distance of more than four hundred yards from the tanks where it is mixed with the drainage from the byres.

"These tanks are four in number, of the following dimensions respectively: $48 \times 14 \times 12$; $48 \times 14 \times 15$; $72 \times 14 \times 12$; $72 \times 17 \times 12$. They have each a separate communication with the well from which their contents are pumped up, which are used in different degrees of 'ripeness,' a certain amount of fermentation induced by the addition of rapedust being considered desirable. The liquid is diluted, according to circumstances, with three or four times its bulk of water, and delivered at the rate of about four thousand gallons an hour, that being the usual proportion to an acre. The quantity to be applied is determined by a float-gauge in the tank, which warns the engineer—whose business it is to watch it—when to cut off the supply, and this is a signal to the man distributing it in the field to add another length of hose, and to commence manuring a fresh piece of land. The pumps are worked by a twelve-horse-power steam-engine, which performs all the usual work on the farm, thrashing, cutting chaff and turnips, crushing oil-cake, grinding, etc., and pumping.

"The pipes are of iron; mains, submains, and service pipes, five, three and two inches in diameter respectively, laid eighteen inches or two feet below the surface. At certain points are hydrants, to which gutta-percha hose is attached in lengths of twenty yards, at the end of which is a sharp nozzle, with an orifice ranging from one to one and a half inch, according to the pressure laid on, from which the liquid makes its exit with a jet of from twelve to fifteen yards. All the labor required is that of a man and a boy to adjust the hose and direct the distribution of the manure, and eight or ten acres may thus be watered in a day. There are now seventy acres of Italian rye grass and one hundred and thirty of root crops upon the farm. The quantity they would deliver by a jet from a pump worked by a twelve-horse-power steam-engine would be forty thousand gallons, or one hundred and seventy-eight tons

per diem, and the expense per ton about twopence, but a double set of men would reduce the cost. The extreme length of pipe is three quarters of a mile, and with the hose the total extent of delivery is about one million nine hundred thousand yards, or four hundred acres.

"To deliver the same quantity per diem by water-carts to the same extreme distance would be impracticable. One field of rye grass, sown in April, had been cut once, fed off twice with sheep, and was ready (August 20th) to be fed off again.

"In another, after yielding four cuttings within the year, each estimated at nine or ten tons per acre, the value of the aftermath for the keep of sheep was stated at twenty-five shillings an acre. Of the turnips, one lot of swedes, dressed with ten tons of solid farm manure, and about two thousand gallons of the liquid, having six bushels of dissolved bones along with it, was ready for holing ten or twelve days earlier than another lot dressed with double the amount of solid manure without the liquid application, and were fully equal to those in a neighbor's field which had received thirty loads of farm-yard dung, together with three hundredweight guano and sixteen bushels bones per acre; the yield was estimated at forty tons the Scotch acre, and their great luxuriance seemed to me to justify the expectation. From one field of white globe turnips sown later, *and manured solely with liquid manure*, from forty to fifty tons to the Scotch acre were expected. A field of carrots treated in the same manner as the swedes, to which a second application of liquid was given just before thinning, promise from twenty to twenty-five tons the acre. Similarly favorable results have been obtained with cabbages, and that the limit of fertility by these means has not yet been reached was clearly shown in one part of the Italian rye grass which had accidentally received more than its allowance of liquid, and which showed a marked increase of luxuriance over that around it. The exact increase of produce has not been accurately determined, but the number of cattle on the farm has increased very largely, and by means of the Italian rye grass at least *four* times as many beasts as before can be kept now on the same extent of land, *the fertility of the land being at the same time increased*. This plant, of all others, appears to receive its nourishment in this form with most gratitude, and to make most ample returns for it; and great as are the results hitherto obtained, I believe that the maximum of productiveness is not yet reached, and that the present experiment must be carried yet further before we know the full capabilities of this manure. Of one important fact connected with this crop, I am assured that, notwithstanding the rank luxuriance of its growth, animals fed upon it not only are not scoured, but thrive more than on any other kind of grass in cultivation.

"Taking into the irrigation account the whole cost of the engine and the whole of the fuel and wages—although half of these might have been deducted—the following appears to be the capital account and working expenses for fertilizing Myremill farm:

Tanks complete	£300	
Steam-engine	150	
Pumps	80	
Iron pipes, laying, and hydrants	1,000	
Gutta-percha distributing pipes, etc.	56	
	£1,586	
Actual interest on £1,586, and wear and tear at 7½ per cent.	£118	19*s*.
Annual wages	104	0
Fuel	58	10
	£281	9*s*.

"This amount, divided by the number of acres, is equal to the annual sum of fourteen shillings per acre.

"I now come to the practical results of so cheap a mode of fertilizing land.

"Mr. Young informed me that in one of the fields he had himself measured the growth of Italian rye grass, and had found it to be two inches in twenty-four hours; and that within seven months Mr. Kennedy had cut from a field we were passing at the time seventy tons of grass per acre.

"Where the whole is cut, four or five heavy crops are thus taken; but upon some of the land during the past two years twenty sheep to the acre have been penned in hurdles, and moved about the same field from time to time; after each remove the fluid has been applied, and immediately followed by an abundant growth of food. There is not the slightest appearance of exhaustion in the land—its fertility appears to increase. I was informed that before the liquid manure was used the land would not keep more than a bullock or five sheep to the acre, nor will it maintain, if the crops are cut and carried in, five bullocks or twenty sheep to the acre. Some beans, bran and oil-cake are bought for the stock; but, on the other hand, one third or more of the farm is kept in grain, notwithstanding the great number of live stock.

"*Canning Park—Mr. Telfer's Farm, near Ayr.*—This is a small dairy farm of forty acres, near the level of the sea, and about a mile and a half west of the town of Ayr. The subsoil is beach gravel with a slight admixture of clay. Water is too abundant. It lies dead within about twenty inches of the surface, and in winter nearer than that.

"No bedding or litter is used here. The cows lie on cocoanut mats. The ventilation is perfect, and the air sweeter than in the majority of the dwelling-houses of human beings.

"The following appears to be the cost of carrying out the system of Mr. Telfer's farm:

Tank	£30
Engine	60
Iron pipes and hydrants	100
Distributing hose-pipe, etc.	20
	£210

Annual interest on £210, and wear and tear at 7½ per cent	£15	15s.
Wages and fuel	11	0
	£26	15s.

"In summer the cows have a quantity of oil-cake as well as grass; and in winter they have turnips or mangel-wurzel, bean or barley meal, and cut hay or grass, the whole mess being steamed together. Miss Bell, the cousin of Mr. Telfer, manages the dairy, and said that last year the hay bought would amount to from £30 to £40, and she should think the grain to not less than £200. In general terms, the other food is produced upon the farm. As to the produce of grass, which is the chief article, the first cutting during the present year was in the latter end of March, about eighteen inches thick. The second was from eighteen inches to two feet thick. The third was from three feet to four feet six inches thick. The fourth nearly the same. The fifth was two feet thick; and the sixth, in process of cutting at the time I was there, we measured at eighteen inches thick. Taking the mean, where two dimensions are given for the same crop, I find the aggregate depth of grass grown and cut off this farm within seven months to be not less than fourteen feet three inches. All this is, however, eaten upon the premises, and the whole marketable produce of the farm is represented by the milk and butter.

"As to the quantity and value of these, Miss Bell stated that the previous week the butter was one hundred and fourteen pounds and one hundred and twenty pounds—together two hundred and thirty-four pounds sold at one shilling per pound. This, she stated, was about the average quantity and price. The amount for butter would therefore be £11 14s. per week, or per annum £608 8s. She informed me, further, that during about eight months in the year the cold milk realizes about the same amount as the butter. In the summer months, during hot weather, the market value of the milk is only about half that of the butter. From these data, the amount of milk sold per annum is £507. The total receipts for the two articles of milk and butter amount to £1115 8s. per annum.

"I only need to add that, previous to the adoption of the present system of farming, these forty acres of land were barely sufficient to support eight or nine cows, and would have been well let at a rental of thirty shillings an acre."

EXTRACT FROM TABLE SHOWING COST, ETC., OF THE APPLICATION OF SEWAGE WATERS AND LIQUID MANURES.*

Name of Place.	No. of English Acres.	Mode of Application.	Cost of Works and Apparatus.	Annual Interest, etc., at 7½ per cent.	Annual Working Expenses.	Total Annual Charge per English Acre.	Observations.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	
Edinburgh.							
Craigentinny Meadows	63	Steam-engine, pumps, and open gutters and panes.	2,000 0 0	150 0 0	117 12 0	4 4 11	Average rental upward of £16 per English acre.
High-level Sea Meadows.. ..	38	Gravitation, open gutters and panes.	700 0 0	52 10 0	19 17 6	1 18 11	Worth about £20 per English acre; worthless before.
Old Meadows	228	" " "	2,700 0 0	202 10 0	119 5 0	1 8 2½	Maximum rental £25 per acre.
Nottinghamshire.							
The Duke of Portland, Clipstone Meadows............	300	Catch-meadow, gravitation and open gutters.	36,000 0 0	2,700 0 0	150 0 0	9 10 0	Worth upward of £12; previously 3s to 5s.
Wiltshire.							
Wiley Meadows..............	150	Beadwork of ridge and furrow, gravitation and open gutters.	3,000 0 0	225 0 0	52 10 0	1 17 0	Four heavy crops of grass per annum.
Devonshire.							
Duke of Bedford...	90	Beadwork and catch-meadows, gravitation and open gutters.	1,183 0 0	88 14 6	67 10 0	1 14 8½	Land more than quadrupled in value after only four years' irrigation.
Berkshire.							
Pusey Meadows	100	Catch-meadow, gravitation and open gutters.	445 0 0	33 7 6	37 18 4	0 14 3	Land not previously worth 5s. per acre yielding 6 heavy crops of grass per annum.
Glasgow.							
Mr. Harvey's Farm..........	508	Steam-engine, pumps, underground iron main pipes, and distributing pipes.	1,450 0 9	108 15 0	240 10 0	0 13 9	Ten feet thick of grass cut from an acre in six months.
Ayreshire.							
Myremill Farm.........	508	Steam-engine, pumps, underground iron main pipes, gutta-percha hose.	1,586 0 0	118 19 0	162 10 0	0 11 1	Seventy tons of grass from one acre in six months.
Lancashire.							
Halewood Farm.............	120	Engine, pumps, underground mains, gutta-percha hose and jet pipe.	521 12 0	39 2 5	19 15 2	0 9 9¾	One dressing of liquid equal to 20 or 25 tons of farm-yard manure per acre.

* Encyclopædia Britannica, from "Minutes of Information."

The agricultural editor of the *Encyclopedia Britannica* cautions those who venture upon such experiments not to be rash or too sanguine, and is inclined to doubt the feasibility of such expensive apparatus.

It would seem, however, that the experiment is well worth trying in our dryer climate, as promising great advantages, especially in seasons of long drouth, not only for grass fields, but for maize, sorghum, and other important soiling crops, and in the Southern States, where the pastures are parched by the scorching sun, to raise immense crops of Johnson grass (*Sorghum halapense*) and Millo maize. Satisfactory results have attended the use of the sprinkling-cart on small farms, but a permanent system of irrigating apparatus ought to return a large dividend when well managed upon good land and with first-rate Jersey stock.

Theory of Cultivation.*

"The main conditions required in the cultivation of the soil are:

"1. A thorough pulverization and drainage of the soil.

"2. A progressive chemical disintegration or liberation of insoluble ingredients.

"3. A renewal, by means of manure, of those substances which have been removed from the soil by successive crops.

"The art of cultivation consists in aiding nature to accomplish these conditions with greater celerity than, unaided, would be accomplished.

"By means of the plow and harrow the soil is mechanically pulverized, and fresh surfaces exposed to the disintegrating action of the air. Many soils, especially clayey varieties, contain a very large amount of alkalies, which, by the action of carbonic acid, are liberated and become soluble. In such cases it is more economical to depend upon this vast magazine of supply for the necessary alkalies than to import them in the form of manures. But, as the disintegration of the soil and liberation of the ingredients proceed with slowness, it is necessary not only to offer every facility by increasing the surfaces, but also to admit the air and fresh supplies of rain-water, so as to render the treasures available within the prescribed period; this is effected by drainage. It is to such rich soils only that the Roman methods of culture apply.

"Cato gave good advice; for plowing is both the first and second operation of good farming, and manuring is the more advantageous the more thoroughly prepared and pulverized the soil is; for manure, like land, requires disintegration to render its constituents thoroughly available. The plow and the harrow are, therefore, both mechanically and chemically advantageous. They are mechanically useful in fitting the soil for the reception and growth of plants, and chemically by increasing

* Lyon Playfair, Morton's Encyclopædia of Agriculture.

the absorptive powers of the soil for aerial food, and also by admitting those atmospheric influences which disintegrate the soil and liberate the mineral food.

"If the subsoil do not contain an excess of iron, and be not sufficiently tenacious to alter the character of the upper soil, trench-plowing is useful, by presenting to atmospheric influences a new and unexhausted magazine of mineral food. The oxygen, carbonic acid, and rain-water acting on this freshly upturned soil render soluble the alkalies and other ingredients formerly present in an insoluble form; but when the subsoil is either too slowly acted upon by the air or too tenacious, it may act injuriously by preventing that very disintegration which it is intended to promote.

"The lower oxide of iron, if it be present, absorbs the oxygen, which ought to find its way to the roots of the plants; or the tenacity of the soil acts mechanically, by preventing that access of air which the iron refuses to allow to pass by its chemical properties. In all such cases subsoiling is preferable to trench-plowing, because the subsoil, being loosened, is progressively acted upon by disintegrating influences, and, in a few years, changes its character sufficiently to enable it to be mixed with the surface soil without danger. This subsoiling cannot, however, be advantageously done without a previous natural or artificial drainage; for unless the soil be sufficiently free from moisture it cannot be acted upon by the atmospheric causes of change. The more accessible the soil is to air and to the free passage of rain-water the quicker will it become fitted for the wants of vegetation.

"The term cultivation properly includes the abnormal growth or increase of particular ingredients in plants, such as the gluten in the cereals and the starch in the potato."

Plowing.*

"Wherever farming is conducted on an extensive scale, plowing constitutes the principal operation, as being the preliminary process necessary to prepare the soil for the subsequent series of processes by which systematic cultivation is effected. For this purpose oxen, asses, mules, and horses have been variously employed by different nations to draw the plow, ever since the cultivation of the soil became the necessary consequence of a settled state of society. Up to very recent times oxen appear to have been principally employed for this purpose; and their docility, strength, and endurance, combined with the simplicity of the apparatus required to yoke them, were properties which, in the estimation of the unscientific and uninventive tiller of the soil, gave them a superiority in field labor over all other animals of draught.

"The employment of horses in plowing and other agricultural operations,

* John Haxton, Morton's Encyclopædia of Agriculture.

and the introduction of the *iron plow*, are, undoubtedly, among the greatest improvements effected in agriculture.

"When land has been well plowed, and cultivated to a proper depth in preparing for green crops, deep plowing for the subsequent grain crop is not only unnecessary, but oftentimes injurious. This is particularly to be observed in the cultivation of wheat, in which experience has taught us that the firmer the soil is in which the roots of the young plants are embedded, the better are they able to withstand the changes and shiftings produced in the immediate surface soil by the effects of alternate frosts and thaws. Thus it is that the peculiar habit of growth of plants must be studied, and a cultivation adopted which accords, as nearly as possible, with the requirements of nature; and this knowledge is necessarily the result of observation."

AMERICAN CULTIVATION.

The greatest improvements (with the exception of the steam plow) in recent years have been made by American inventors. For those who are interested in the subject of the history of plows I refer them to the Annual Report of the New York State Agricultural Society for 1867. The more recent history of plows and plowing must be studied in the productions of the past few years that are offered for sale by the best dealers.

Among the modern improvements are the plows for turning *flat furrows*; the better adjustment for power, especially in the sulky plows; the use of better material, as in the best steel plows; the greater pulverizing power, as exhibited in the Sackett plow; non-liability to choke in stubble; lightness of draught; ease of holding; durability; cheapness; excellence of workmanship; even distribution of wear; effective service in burial of weeds and stubble; regularity of turning flat furrows. Whatever force is used for propelling the plow, the wheel plows undoubtedly have the advantage of easier draught, better quality of work, effective work in drouth-baked land. The efficiency of the wheel plow is independent of the skill of the plowman, and when once properly adjusted will cut every furrow of an equal width and depth, and lay them all over uniformly level. The Sackett plow is the best of its kind, as it serves the purpose of both plow and harrow, doing much better work than can be done with both of those implements; but it can only be used in fine land that is free from stones and rocks.

HARROWS.

Great improvement has been made in harrows. The best implement has an iron frame with steel spring seat, and slanting, reversible steel teeth, which have a cutting edge for pulverization and a round edge for smoothing and cultivating all kinds of crops, and the frame also in sections, to which plow-handles can be attached, and each section used as a cultivator between rows or drills. This imple-

ment is the most effective and useful of its class, and absolutely indispensable to every farmer. It is the best pulverizer, the best cultivator, the best for the purpose of scarifying old pastures and meadows that need renovation.

With this harrow wheat may have three harrowings in early spring; oats and barley two or more, or until three inches high; corn can be harrowed every week, until twelve inches high. The round edge is also used for covering clover seed. Among the harrows for grass seed that require covering only one eighth of an inch, is the chain-harrow, an implement which consists of a draught-bar to which are attached pairs of square-linked chains, each seven and a half feet long, connected by cross-links, and kept expanded by two movable stretchers.

ROLLERS.

These are usually hollow cylinders of cast iron, of diverse weights, for one or two horses. They may have a smooth surface or may be formed of a series of corrugated rings or discs having serrated edges and side-way projecting teeth. Some require three horses abreast to work them. They are very effective for breaking clods, consolidating loose soils, checking the ravages of the wire worm, and covering in clover and grass seeds. For grass seeds the smooth roller is best, with the brush-harrow or chain-harrow attached. Another form of roller is made of a series of eccentric fluted discs, which is said to possess many advantages over any other implement of its class.

CULTIVATORS.

An implement is needed for the effective cultivation of maize that shall *finely pulverize the surface to a depth of one inch*, and work smoothly without plunging or destroying the rootlets of the growing plants. Maize needs, especially in a drouth, a mulch of soil like fine flour, of a depth not to exceed two inches, and the culture should always be level and smooth.

DRILLS.

These implements secure straight rows, and thereby assist in clean culture for all kinds of grain and root crops. Drills are of various patterns, some of them constructed for planting several rows at once, and dropping manure at the same time; while others have added an irrigating apparatus for moistening manure and seed in dry ground, and are more effective in promoting germination, even upon damp ground, and also intensifying the effects of the superphosphates.

OTHER IMPLEMENTS.

Among the many useful machines and implements for tillage, harvesting and feeding, a completely equipped dairy farmer needs trench plows; subsoil plow; a manure-spreader; a horse-hoe; carrot-thinner; reaper and binder; mowing-machine; hay-tedder; horse-rake; hay-loader; thresher; fanning-mill; grinding-mill;

root-cutter; hay-cutter; corn-stalk crusher; standard weighers, scales and measures; also improved wagons and farm-carts.

FIELD TILLAGE.

As a general rule, no tillage operations can be performed when the soil is wet. Clay soils especially are liable to great injury in this way. Plowing or harrowing land when wet is destructive to crops.

Rotation of Crops.*

"The arrangement of a certain succession of crops, by which each shall follow in such a rotation as shall best economize the resources of the farm, has long been an object of primary consideration among agriculturists. The fact that certain crops impoverish the soil in a greater degree than others is very much dependent on the use that is made of them.

"If a crop is entirely removed from the farm on which it is produced the land will obviously be deprived of some of those elements which would be restored to it by the consumption of the whole or a portion of the same crop on the ground. The manner in which a crop is cultivated will also influence the condition of the soil. A succession of grain crops, grown in such a manner as would not admit of the soil being kept free from weeds, even though they did not of themselves draw from the soil a greater supply of the elements of fertility, would be more injurious to it than a succession of well-hoed crops, the intervals between the rows of the latter and the comparatively late period of the season at which they are sown admitting of the complete eradication of weeds.

"The inorganic matter abstracted from the soil by any one crop is so small in amount as to render the choice of a particular crop, in reference to that point, of little moment. A deficiency is generally rectified by the manure applied in the ordinary routine of cultivation. Without entering, in this place, on the scientific investigation of this subject, it will be found that, for practical purposes, the principle to be kept in view, in fixing on a rotation of crops, is, WHAT SUCCESSION IS BEST SUITED IN A GIVEN LOCALITY TO DRAW FROM THE SOIL THE LARGEST NET RETURN, WHILE THE CAPABILITIES OF THE LAND ARE, AT THE SAME TIME, MAINTAINED AND INCREASED.

"There are three conditions, namely, climate, nature of soil, and local position, which must first be observed in dealing with this subject. Some plants are best adapted to a dry, some to a moist climate; one is suitable to a stiff clay soil, another to a loam, and a third to a sand. The local demand for a particular crop may render its culture on a particular soil remunerative; while the absence of such a demand may make the same crop on a similar and suitable soil of little value.

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* James Caird Morton, Encyclopædia of Agriculture.

THE ENGLISH SYSTEM.

"*Norfolk.*—Here the four-course system had its origin, and here it is still practised in the best style. But this county, which was the first to break through the old system of cropping as long as the land would yield grain, is now beginning to amend its own improvements. The ease with which artificial and other manures can now be procured, and the readiness with which they may be applied to the land at any period of the rotation, have taught the enterprising farmers of this county that the matter for their consideration, in fixing on a course of crops, is simply which, with a given outlay, will produce the largest return, and, at the same time, most enrich the land. Instead of the four-course, the following is adopted by some first-rate farmers, namely: 1, clover, trefoil or peas; 2, wheat; 3, oats; 4, turnips; 5, wheat or barley. Every crop is manured for, either by direct application or by sheep-feeding.

"And on a large farm, where this system has supplanted the four-course, the average produce of all the grain crops has increased, in ten years, between thirty and forty per cent.; the extent of land on this farm in wheat having, during that period, annually increased, till it has now become one-third greater than it was then. The four-course is conducted thus: the clover lay, after being mown, is dunged. A rapid growth of aftermath is produced, which is plowed in to enrich the ground for the wheat crop. In spring the young wheat receives a dressing of one hundred weight of nitrate of soda and two hundredweight common salt mixed, and sown by hand in two applications, at an interval of three weeks, beginning in March and ending in April. When the wheat is removed the ground is plowed and sown with rye, which is eaten off in spring, and followed by the turnip crop. Dung, superphosphate, and guano are applied to the turnips, the greater proportion of which are consumed on the ground by sheep which are also cake-fed. The land is thus prepared for barley, which is sown out with red clover, and with trefoil and white clover alternately. No rye grass is sown with the clovers, as it is reckoned injurious to the following wheat crop. Many of the best Norfolk farmers do not hoe their wheat crops in spring, as hoeing has been found to increase the proportion of inferior grain. The wheat fields are rolled in spring with advantage to the crop."

AMERICAN ROTATION.

A system of rotation for Jersey dairy farms in America must depend upon greatly varying conditions of soil, climate, and proximity to market. Soiling or pasturing of stock also necessitates a variation of crops. Where soiling is practised, especially in a case where the land is both underdrained and irrigated with liquid manure, the rotation may often include two grain crops and one root crop in a single season from the same piece of ground. For the ordinary method of dairy practice

the following rotation may prove useful: 1, clover; 2, carrots or mangolds; 3, rye or barley; 4, sweet corn; 5, oats; 6, barley. Or this: 1, oats; 2, sweet corn; 3, rye forage; 4, Hungarian grass; 5, clover and grasses; 6, carrots or parsnips.

ROTATION OF SOILING CROPS.

1. Winter barley, winter wheat, and winter rye sown in September and October for the May and June feeding, may follow on land that has fed a crop of corn fodder.

2. Barley, oats, oats and peas, oats and vetches for early spring sowing, for June and July feeding. Lucern, red clover, large clover, alsike, alsike and timothy, are also included in this list for second growth for June and July feeding.

3. Millet, Hungarian grass, dent corn, flint corn and sweet corn for July feeding.

4. Sweet corn, flint or dent corn grown on the ground that was occupied by barley and rye, for August feeding.

5. Sweet corn grown on the ground that was occupied by the barley, oats and peas, for September feeding.

6. Barley and rye, grown on the ground that furnished the millet, Hungarian grass, and early corn fodder, for October and November feeding.

7. Carrots, parsnips and mangolds to follow clover and lucern every second or third year.

It would be impossible to specify any course of crops which can be recommended as the best under all circumstances. The agriculturist may select without much difficulty the course of crops most suitable to his soil and locality, and those best adapted to his needs, which are elsewhere mentioned under the list of soiling crops in another section of this work. He may therefore, by saving his manures in tight vats and continually enriching his soil, grow any crop suitable to his climate and soil, in such a succession as he pleases, the conditions needful to success being that the land must be kept *dry*, *clean*, and *rich*.

PLANNING FOR ROTATION.

In order to plan for a rotation of soiling crops it is necessary to know how much a full-sized cow requires for the season.

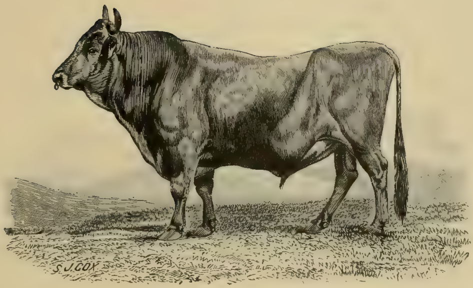
If your soil is of average good quality the daily allowance for one cow will be one square rod of grass, clover, or lucern; three fourths of a rod of barley, oats, oats and peas, rye or millet; and about one half a rod of maize or sweet corn. Rich land will require less.

Estimate the amount of ground you will need for the season according to the number of cows and the variety of crops to be cultivated.

For all the annuals there must be a regular planting in periods, of every seventh

ALPHEA 171.

A Fountain Head.



MERCURY 432.

AT 12 YEARS OLD.

Alphea Type.

SIMPSON HERD.

WILLIAM SIMPSON, 51 CHATHAM STREET, NEW YORK.

day, so that there shall be provided a succession of young, tender, juicy herbage, ready to be cut while in bloom, that the waste from toughness may be reduced to the lowest degree. It would be preferable to double the frequency of seed-sowing rather than to lengthen the above-named period.

PUNCTUAL PERFORMANCE OF ALL FARM-WORK.

"A stitch in time saves nine."—*Old Proverb.*

The farmer who excels the average achievements of agriculturists must needs be free from the fetters of prejudice and a merely routine agricultural education. He must bring to bear upon his calling all the tact and business ability with which he is gifted and experience enables him to develop in himself.

Energetic industry and sound common sense, combined with systematic and thorough methods and extreme punctuality in all operations, are the elements upon which depends the success of the farmer.

It is well for every farmer to have a calendar of operations for the year made to suit his locality and the special work upon his farm.

JANUARY.

Take account of stock and balance the books.

This is generally the coldest month of the year. Those who have access to beds of marl or other natural fertilizers, as well as factory waste, may cart them upon lands which are suitable, during the whole winter, but the earlier the better, so as to get the beneficial action of the frost upon them. Thrashing of grain, composting manures, preparation of bone manures. Tools and implements should be looked over to see that they are in good condition.

Cattle should be made very comfortable in good stables that are both warm and well ventilated.

Harness should be kept well oiled, bright and clean, and not allowed to freeze or crack from getting wet.

Water-meadows must be closely watched, where the English method is adopted; obstructions from dead leaves removed; let the water flow until a scum appears upon the grass, an indication that the soil is surfeited with water.

Prune trees.

Breed cows for winter butter.

Cows should be kept in good condition and full flow of milk for winter butter.

FEBRUARY.

The weather is generally very irregular during this month. Where the climate admits, oats, barley, peas and spring wheat are to be sown.

Parsnips may be sown in our Middle and Southern States the last of this month.

Seeds of all kinds must be procured this month, if they are not grown upon the farm—grass, clover, maize, carrot, mangold, parsnip, rutabaga, rye, barley, oats, peas, millet, vetch, sweet corn—everything needed for forage crops, pastures and meadows. Grass land intended for oats or barley should be plowed as soon as they are dry enough. Oil the wood and metal of tools and machines with petroleum. Guano and superphosphate or other artificial manures should be purchased and stored this month. Finish pruning apple-trees. Allow no cattle to go upon wet grass lands, as they will seriously injure the sod by trampling it.

The water-meadows, if they have been successfully irrigated, will begin to show green in the South and central States.

Look well after the young calves. The calf-cribs should have one occupant only, with plenty of bedding. Keep them warm and dry, and with a constant supply of pure air, always putting a little rennet in the warm mixed milk to prevent any trouble from indigestion. Breed cows for winter dairy.

MARCH.

This is the first month of agricultural spring over the greater portion of America. The soil dries rapidly. Toward the end of the month young wheat and rye will require hoeing, or the slanting-tooth smoothing-harrow may be used, followed by the roller, if the land is sufficiently dry.

Oats may be sown this month as soon as the ground can be made ready, barley a few days after oats, one to two bushels of seed per acre. Pickle four bushels of oats or barley in a gallon of water containing two ounces of sulphate of copper, as a safeguard against bunt and smut.

Grass and clover seeds may be sown near the end of the month, best on ground especially prepared for them, and not with grain crops. After sowing the clover and grass seeds, go over the ground with the roller and brush-harrow attached, or use the chain or web-harrow.

Carrot ground should now be prepared by deep plowing and thorough manuring. Rich ground thoroughly pulverized, and mixed with manure to the depth of twelve inches, will give good returns for the butter dairy. Subsoiling, going twice in the furrow, is a good preparation for carrots.

Spring vetch may begin the first sowing this month, with peas.

Sow mixtures for soiling crops.

Plant apple-trees this month as early as possible. Also attend to grafting and budding.

Plant hedge fences of prim as an accompaniment to barbed wire.

Dig around and clean young hedges.

Where water-meadows have been regularly irrigated through the winter a good

crop of grass may be now expected; the rye fields also afford good pasture. Use dry hay with this green food to prevent violent scouring.

If cows are properly kept they will not be in much danger of colostrum fever or apoplexy, a disease induced by a high condition, plethora, fat, and a constipated condition of the bowels, probably often complicated by a cold from sudden draught of air. These conditions are made worse by neglect of exercise and insufficient or improper stable ventilation.

The month of March is an important month to look after the destruction of all kinds of field and barn vermin, such as *mice*, *rats*, and *stray dogs*.

The rats and mice destroy a vast amount of farm produce. Soak a box of matches in a half pint of water, and mix the water with flour enough to make a stiff dough; place this where rats or mice or only small creatures can have access to it. They are very fond of this phosphorated poison, and eat it with avidity to their destruction.

Any mongrel cur or thoroughbred hound straying without his owner on any field thereby forfeits his life. He is easily tempted to injure live stock, and may, by causing fright in a herd, be an agency of producing abortions. One dog will destroy a large flock of choicely bred sheep in a few minutes. Dog-skins make the best gloves, and their carcasses and bones the best manure for meadows and orchards.

Begin to set dog-traps in the month of March. Make a pyramidal frame of slats, leaving a space at the top for them to jump in as they ascend the ladder to get at the bait, which may be a large piece of meat that has been perforated with skewers and the holes filled with powdered strychnine. A large number of dogs may be captured in this way, and thus may be secured a great quantity of the most valuable manure at a little expense, and thereby may be prevented the danger of frightened herds, abortion, or the mangling and destruction of thousands of dollars' worth of sheep throughout the country.

The dairy work is beginning to increase. Provision should be made for prompt performance of every kind of work. The cows should be milked regularly by the minute, two or three times daily, as they require, and all dairy operations, as well as the milking and feeding, should be begun and finished according to a fixed schedule and time-table. Neither good butter nor cheese will be made in this month without oatmeal, parsnips, clover hay, and a little green rye, or water-meadow pasture, combined.

APRIL.

The weather is capricious, with showers, hot sun, cold winds, and nipping frosts, especially in the central and northern States and Canada.

Wheat will require harrowing, after which it may have the roller.

Pull all thistles, docks, daisies and dandelions in grain crops and meadows. These can only be rooted up when the ground is moist after a rain.

Barley sowing may be completed this month. Carrots may be entirely planted this month. The land, deeply tilled and rolled as hard as possible, is to be sown in rows eighteen inches apart by the drill, which is to be followed by a light roller to complete the operation. Five pounds of seed are rubbed, soaked in diluted urine and warm water, mixed with two bushels of ashes or sand, with the drill set to sow two bushels. A few oats added will earlier show the line of the row, so that weeding may begin before the carrots appear above ground. Mangold-wurzel may be planted this month. These are dibbled half an inch deep in richly manured soil, two feet apart by one foot in the drill. A light roller follows. Kohl-rabi may be sown for transplantation in May. Successive beds may be sown for transplanting all through the summer to cultivate like turnips. Use the wheel-hoe cultivator. Lucern may be sown by the end of April, ten pounds per acre, in rows one foot apart, on deeply tilled, rich, calcareous soil. Spring vetches or peas, alone or with oats, may be sown during April for soiling in July and August.

Turnip land may have its first plowing in April, after which it should be harrowed and kept clean from weeds.

Paring and burning is the most efficient method of breaking up old grass lands. Spread the ashes, plow, harrow and roll.

April is a good month for laying down grass lands, either by sowing grass seed or by planting bits of turf six by six inches on a well-tilled field. Follow both grass seed and turf with the roller, and give a coat of fine manure broadcast or saturate with liquid manure. In the early part of April, in moist or showery weather, sow guano and superphosphates upon grain crops. More easily soluble manures, as nitrate of potash, may be sown later and in dryer weather. Hedges and trees may still be planted. Puddle the roots well. Keep orchards, hedges, and all crops free from weeds by frequent stirring of the surface or mulching the ground.

Cattle will continue to receive parsnips and mangolds, a portion of green rye and Italian rye grass. Cheese-making is on the increase. The cows are turned to grass at the latter part of this month in most of the country, but they need hay until accustomed to the change, or they may receive part soiling of rye and rye grass with roots.

Peas require *lime, bone-powder, or marl*, to insure a good crop.

Cattle need one eighth of an ounce of salt every day.

Rennet is now prepared by the following method: One gallon of thin whey is boiled with a handful of salt and a spoonful of saltpetre; the solution is then strained, and when it is cooled to the temperature of 98° Fahr. four large maws or rennets are put into it; the whole is placed in a covered jar, and may be used after standing fourteen days. To this may be added one fourth part alcohol for keeping. A very small quantity of this preparation should be mixed with the food of all young calves, as a preventive against indigestion and consequent diarrhœa. Four

ounces of this solution without the alcohol will be sufficient for a cheese of thirty pounds.

Two jars of rennet should be kept to be used alternately. The rennet-skins may be resalted, dried, and used again the following year if desired. Use no so-called "rennet" manufactured from mineral acids; only a pure article.

MAY.

Wheat, if too heavy, may be topped again, as in April. Weeds must be pulled out of grain crops. Plant maize as soon as the ground is warm enough. Carrots may be cultivated and hoed, and singled out by the end of May, as also parsnips.

Mangolds need tilling and cleaning with hand-hoe work. Use the prong-hoe and single out the plants. Seize the best plant by the left hand, and tear the rest away with the right hand very abruptly.

Blanks may be filled by plants thus taken out.

Rye, barley, vetches, clover, and Italian rye grass will have been the soiling supply for Jersey cattle. The land that is cleared of these crops is to be immediately plowed again.

Rye grass and lucern will make a succession of cuttings till autumn.

Irrigate the late-planted trees. Destroy caterpillars and moths upon trees and crops before they scatter from their webs.

Water the newly-set hedges. Plant maize fields.

Sow buckwheat for green manure, one bushel to the acre, in drills one foot apart, and cultivate once.

Ply the cultivator and hoe against all weeds in all crops.

Early cleanliness and thorough cleanliness are indispensable to success.

Rich spots in pastures should be mown gradually, and cattle will eat the hay which they would not eat as rank grass.

Cattle will receive full allowance of green food by the end of the month or before, and will have finished the mangolds.

There is economy in letting pasture be very forward in growth before stocking it.

If soiling is adopted calculate the quantity of the different crops according to the number of stock on the farm.

If cows are pastured it is economy to use the tether. They should always be housed at night and also during the hottest part of the day, with at least one feed in the stable and great abundance of pure clean water.

If cheese is made, pigs are needed to consume the whey and buttermilk.

JUNE.

Mangolds require the wheel-hoe cultivator, and the second cleaning by the six-tined hand-hoe.

Carrots and parsnips must be singled out as early as practicable, at intervals of eight to twelve inches, and kept clean of weeds. Sow millet for a crop of hay from the first to the tenth of the month. The maize will require the smoothing-harrow until six to twelve inches high, two, three or more harrowings. Orchard grass ready for soiling.

Clovers for soiling, vetches and oats also. Clovers for hay may be mown and early grasses for hay. Look sharp to keep all weeds down this month. Allow no weed to flower and seed. Cut clover and grass for hay *as soon as they begin to flower, then they are most nutritious.*

Thumb-and-finger pruning for apple-trees cannot be neglected this month.

Let every superfluous growth be pinched off while it is tender and small.

Keep the pastures well fed, and mow the grass that is too rank to be eaten by stock. Allow one or two fields for a reserve in case of drouth. Never allow thistles, weeds and briers to encumber grass lands. Thistles may be spudded in dry seasons, or pulled with tweezers in wet weather. Spread all droppings of cattle within three days. Mow the early meadows. Be careful to guard against hoven upon change of feed. Give the working horses and oxen a plentiful feed of oats. This is the month of most abundant pasture and good soiling crops. Cattle need salt every day.

Dairy produce is at its height. Change of pasture as often as practicable increases the flow of milk. Give as great a variety of soiling crops as can be grown.

In the hot days pastured cattle should have one or two feeds of soiling crops in the stalls. The quality of the milk will often vary so much for cheese-making as to require a change in the rennet. Cheeses must be very regularly turned. The temperature of the cheese-room should be kept at 60° Fahr. Hang wet cloths near the windows and doors or ventilators, to aid in cooling. If there is a current of air in the cheese-room the cheeses must be well covered to prevent heaving and cracking.

Sow rutabagas from middle of June onward. Sow soiling crops every week.

JULY.

Wheat is in full ear. The bulk of the hay crop is cured before the middle of this month. The last sowing of millet must be made before the middle of the month. All turnips must be sowed before the first of August.

Plantings of maize may be made every two weeks until the middle of July.

Alsike and timothy are now ready for soiling. Green oats should be combined with them in feeding while they last.

Vetches also, combined with oats and peas. The horse-hoe, or wheel hand cultivator, is to be kept moving in all root crops. The thinning process must be finished for carrots, parsnips and mangolds. Turnips hand-hoed. Weeds kept down in all fields. Maize ground cultivated, shallow, fine, and level.

Apples must be thinned on the trees.

Mow all pastures before seeding to prevent smut.

Pastures must be thinned and soiling increased this month. Thistles destroyed. Keep the dog-trap baited. Make a compost of dogs. Cover the heap with fine earth, and pour on daily diluted sulphuric acid until the bones are all dissolved, or use the bone-mill when the bones are cleaned.

This is a busy month in meadow, field, stable and the dairy.

Do not pasture meadows. Keep the stables and the dairy very, *very* clean and sweet. Milk should be kept by controlling the temperature to the right point.

Sow barley for autumn soiling, every week.

Oil wood-work of all tools and machines with petroleum.

Sow sweet corn every week.

AUGUST.

A good time to renovate old pastures and lay down grass lands.

Wheat, rye and barley grains are generally all harvested before the middle of August in the most northern districts.

Fodder corn is the great soiling crop, and vetches, millet, timothy and rye grass, with second cut of clover and lucern. Plow in buckwheat while in full bloom for green manure. Sweet corn is the best green crop of this month. Keep up the full flow of milk and the routine of butter or cheese-making. Sow late barley and rye for soiling.

Grub up and cut bushes and trees in August to destroy them, as they will not sprout.

SEPTEMBER.

Apply lime, marl, and natural manures of all sorts and clay to sands. Burn all rubbish. Cut seed clover. Sow the winter vetches, wheat and rye, before the last week in September. Sow winter barley. Sweet corn, vetches, and barley are good soiling feed.

Harvest and shock the maize; cure corn stover. The pastures have a fresh growth if there are late rains. The full flow of milk must be kept up in the butter dairy.

The stock of cheese is large.

Keep the dog-trap in operation. Dogs make most excellent manure.

OCTOBER.

Gather apples. Feed them to cows lightly at first, beginning with two quarts a day; increase gradually to a half bushel. Run them through a root-cutter. Never allow the chance of choking animals at any time with apples, roots, or tubers, then you will not need to be on the watch to save the best cow in a dire emergency.

This is the great month for wheat-sowing, as well as the planting of winter barley and rye, with winter vetches, though rye generally does better sown in

September. A half bushel of seed per acre for each grain. In Southern States grains may be planted later. Root-crops are all ready for harvesting.

Drains may be opened. Ditches cleaned.

Hedges have last clipping.

Rats, mice and moles, as well as the dogs, are to be trapped or poisoned this month.

October is a busy month with the irrigator of water-meadows. The rowen hay is cured.

Sweet corn and barley are the best green crops of this month.

Take good care of the stock that they do not suffer from the chilly weather and cold rains. Get all the cattle up early to the stables, so as to be prepared for winter in the northern districts by the month of November. Oil wood-work and metal again when tools and machines are stored for the winter. Always have a place for each implement, and when not in use the implement should be in its place in the tool-house.

NOVEMBER.

Keep up the full flow of milk with green barley and corn stover.

Finish harvesting turnips, carrots and mangolds. Parsnips may remain in the ground. Plant prim hedges. Continue ditching and draining.

Put the water-meadows and irrigating works in perfect order, or build them, if land is suited for irrigation. Carrots pull easily after a soaking rain.

Use a heavy roller for the land during irrigation. Turn off the water on the mild Indian summer mornings, and there will be a beautiful green growth of grass.

Cheese-factory work has generally suspended, but the butter dairy must be made perpetual. Sow wheat in Gulf States. Breed cows for winter dairy.

DECEMBER.

The month is variable. The Indian summer is generally cut short a week before Christmas, sometimes much earlier, by very cold ice-making weather.

This will necessitate the stopping of draining and all field operations, which should be well finished before winter sets in.

Commence ice-harvesting as soon as a sufficient depth is frozen, which is from eight to twelve inches.

If you have water-meadows they need as much care as during any month of the year. Let the water flow unchanged during the severest frost, and change the water upon mild mornings.

Cattle must be kept warm, dry and clean, the butter dairy in full operation, with corn stover, oatmeal and carrots fed in the stalls.

The drinking-water should always be tempered to about 65°, and especially not neglected in autumn and spring months. Keep the stables well ventilated and comfortable for all Jerseys, old and young. Breed cows for winter butter dairy.

BREEDER'S CALENDAR.

AVERAGE TABLE OF GESTATION FOR JERSEYS.

Date of Service.	Due to Calve.	Date of Service.	Due to Calve	Date of Service.	Due to Calve.
Jan. 1	Oct. 8.	Feb. 4	Nov. 11.	March 10	Dec. 15.
" 2	" 9.	" 5	" 12.	" 11	" 16.
" 3	" 10.	" 6	" 13.	" 12	" 17.
" 4	" 11.	" 7	" 14.	" 13	" 18.
" 5	" 12.	" 8	" 15.	" 14	" 19.
" 6	" 13.	" 9	" 16.	" 15	" 20.
" 7	" 14.	" 10	" 17.	" 16	" 21.
" 8	" 15.	" 11	" 18.	" 17	" 22.
" 9	" 16.	" 12	" 19.	" 18	" 23.
" 10	" 17.	" 13	" 20.	" 19	" 24.
" 11	" 18.	" 14	" 21.	" 20	" 25.
" 12	" 19.	" 15	" 22.	" 21	" 26.
" 13	" 20.	" 16	" 23.	" 22	" 27.
" 14	" 21.	" 17	" 24.	" 23	" 28.
" 15	" 22.	" 18	" 25.	" 24	" 29.
" 16	" 23.	" 19	" 26.	" 25	" 30.
" 17	" 24.	" 20	" 27.	" 26	" 31.
" 18	" 25.	" 21	" 28.	" 27	Jan. 1.
" 19	" 26.	" 22	" 29.	" 28	" 2.
" 20	" 27.	" 23	" 30.	" 29	" 3.
" 21	" 28.	" 24	Dec. 1.	" 30	" 4.
" 22	" 29.	" 25	" 2.	" 31	" 5.
" 23	" 30.	" 26	" 3.	April 1	" 6.
" 24	" 31.	" 27	" 4.	" 2	" 7.
" 25	Nov. 1.	" 28	" 5.	" 3	" 8.
" 26	" 2.	March 1	" 6.	" 4	" 9.
" 27	" 3.	" 2	" 7.	" 5	" 10.
" 28	" 4.	" 3	" 8.	" 6	" 11.
" 29	" 5.	" 4	" 9.	" 7	" 12.
" 30	" 6.	" 5	" 10.	" 8	" 13.
" 31	" 7.	" 6	" 11.	" 9	" 14.
Feb. 1	" 8.	" 7	" 12.	" 10	" 15.
" 2	" 9.	" 8	" 13.	" 11	" 16.
" 3	" 10.	" 9	" 14.	" 12	" 17.

Date of Service.	Due to Calve.	Date of Service.	Due to Calve.	Date of Service.	Due to Calve.
April 13	Jan. 18.	May 22	Feb. 26.	June 30	April 6.
" 14	" 19.	" 23	" 27.	July 1	" 7.
" 15	" 20.	" 24	" 28.	" 2	" 8.
" 16	" 21.	" 25	March 1.	" 3	" 9.
" 17	" 22.	" 26	" 2.	" 4	" 10.
" 18	" 23.	" 27	" 3.	" 5	" 11.
" 19	" 24.	" 28	" 4.	" 6	" 12.
" 20	" 25.	" 29	" 5.	" 7	" 13.
" 21	" 26.	" 30	" 6.	" 8	" 14.
" 22	" 27.	" 31	" 7.	" 9	" 15.
" 23	" 28.	June 1	" 8.	" 10	" 16.
" 24	" 29.	" 2	" 9.	" 11	" 17.
" 25	" 30.	" 3	" 10.	" 12	" 18.
" 26	" 31.	" 4	" 11.	" 13	" 19.
" 27	Feb. 1.	" 5	" 12.	" 14	" 20.
" 28	" 2.	" 6	" 13.	" 15	" 21.
" 29	" 3.	" 7	" 14.	" 16	" 22.
" 30	" 4.	" 8	" 15.	" 17	" 23.
May 1	" 5.	" 9	" 16.	" 18	" 24.
" 2	" 6.	" 10	" 17.	" 19	" 25.
" 3	" 7.	" 11	" 18.	" 20	" 26.
" 4	" 8.	" 12	" 19.	" 21	" 27.
" 5	" 9.	" 13	" 20.	" 22	" 28.
" 6	" 10.	" 14	" 21.	" 23	" 29.
" 7	" 11.	" 15	" 22.	" 24	" 30.
" 8	" 12.	" 16	" 23.	" 25	May 1.
" 9	" 13.	" 17	" 24.	" 26	" 2.
" 10	" 14.	" 18	" 25.	" 27	" 3.
" 11	" 15.	" 19	" 26.	" 28	" 4.
" 12	" 16.	" 20	" 27.	" 29	" 5.
" 13	" 17.	" 21	" 28.	" 30	" 6.
" 14	" 18.	" 22	" 29.	" 31	" 7.
" 15	" 19.	" 23	" 30.	Aug. 1	" 8.
" 16	" 20.	" 24	" 31.	" 2	" 9.
" 17	" 21.	" 25	April 1.	" 3	" 10.
" 18	" 22.	" 26	" 2.	" 4	" 11.
" 19	" 23.	" 27	" 3.	" 5	" 12.
" 20	" 24.	" 28	" 4.	" 6	" 13.
" 21	" 25.	" 29	" 5.	" 7	" 14.

Date of Service.	Due to Calve.	Date of Service.	Due to Calve.	Date of Service.	Due to Calve.
Aug. 8	May 15.	Sept. 16	June 23.	Oct. 25	Aug. 1.
“ 9	“ 16.	“ 17	“ 24.	“ 26	“ 2.
“ 10	“ 17.	“ 18	“ 25.	“ 27	“ 3.
“ 11	“ 18.	“ 19	“ 26.	“ 28	“ 4.
“ 12	“ 19.	“ 20	“ 27.	“ 29	“ 5.
“ 13	“ 20.	“ 21	“ 28.	“ 30	“ 6.
“ 14	“ 21.	“ 22	“ 29.	“ 31	“ 7.
“ 15	“ 22.	“ 23	“ 30.	Nov. 1	“ 8.
“ 16	“ 23.	“ 24	July 1.	“ 2	“ 9.
“ 17	“ 24.	“ 25	“ 2.	“ 3	“ 10.
“ 18	“ 25.	“ 26	“ 3.	“ 4	“ 11.
“ 19	“ 26.	“ 27	“ 4.	“ 5	“ 12.
“ 20	“ 27.	“ 28	“ 5.	“ 6	“ 13.
“ 21	“ 28.	“ 29	“ 6.	“ 7	“ 14.
“ 22	“ 29.	“ 30	“ 7.	“ 8	“ 15.
“ 23	“ 30.	Oct. 1	“ 8.	“ 9	“ 16.
“ 24	“ 31.	“ 2	“ 9.	“ 10	“ 17.
“ 25	June 1.	“ 3	“ 10.	“ 11	“ 18.
“ 26	“ 2.	“ 4	“ 11.	“ 12	“ 19.
“ 27	“ 3.	“ 5	“ 12.	“ 13	“ 20.
“ 28	“ 4.	“ 6	“ 13.	“ 14	“ 21.
“ 29	“ 5.	“ 7	“ 14.	“ 15	“ 22.
“ 30	“ 6.	“ 8	“ 15.	“ 16	“ 23.
“ 31	“ 7.	“ 9	“ 16.	“ 17	“ 24.
Sept. 1	“ 8.	“ 10	“ 17.	“ 19	“ 25.
“ 2	“ 9.	“ 11	“ 18.	“ 20	“ 26.
“ 3	“ 10.	“ 12	“ 19.	“ 21	“ 27.
“ 4	“ 11.	“ 13	“ 20.	“ 22	“ 28.
“ 5	“ 12.	“ 14	“ 21.	“ 23	“ 29.
“ 6	“ 13.	“ 15	“ 22.	“ 24	“ 30.
“ 7	“ 14.	“ 16	“ 23.	“ 25	“ 31.
“ 8	“ 15.	“ 17	“ 24.	“ 26	Sept. 1.
“ 9	“ 16.	“ 18	“ 25.	“ 27	“ 2.
“ 10	“ 17.	“ 19	“ 26.	“ 28	“ 3.
“ 11	“ 18.	“ 20	“ 27.	“ 29	“ 4.
“ 12	“ 19.	“ 21	“ 28.	“ 30	“ 5.
“ 13	“ 20.	“ 22	“ 29.	Dec. 1	“ 6.
“ 14	“ 21.	“ 23	“ 31.	“ 2	“ 7.
“ 15	“ 22.	“ 24	“ 31.	“ 3	“ 8.

Date of Service.	Due to Calve.	Date of Service.	Due to Calve.	Date of Service.	Due to Calve.
Dec. 4	Sept. 9.	Dec. 14	Sept. 19.	Dec. 23	Sept. 28.
" 5	" 10.	" 15	" 20.	" 24	" 29.
" 6	" 11.	" 16	" 21.	" 25	" 30.
" 7	" 12.	" 17	" 22.	" 26	Oct. 1.
" 8	" 13.	" 18	" 23.	" 27	" 2.
" 9	" 14.	" 19	" 24.	" 28	" 3.
" 10	" 15.	" 20	" 25.	" 29	" 4.
" 11	" 16.	" 21	" 26.	" 30	" 5.
" 12	" 17.	" 22	" 27.	" 31	" 6.
" 13	" 18.				

AVERAGE PERIOD OF GESTATION IN RACES OF ANIMALS.

Elephant		2	years.
Camel		1	year.
Buffalo		1	"
Mare		340	days.
Cow		281	"
Reindeer		240	"
Sheep		144	"
Goat		144	"
Sow		120	"
Dog		63	"
Cat		56	"
Rabbit		28	"
Swan	sits	42	"
Goose	"	30	"
Duck	"	30	"
Pea Hen	"	28	"
Turkey	"	28	"
Guinea Fowl	"	28	"
Hen	"	21	"
Canary	"	14	"
Pigeon	"	14	"

The longest recorded period of gestation in the cow is 313 days.

The shortest period in which the calf survived was a Jersey born at the seventh month.

MEASUREMENTS OF HAY, CORN, ICE AND ROOTS.

One cubic foot of bale hay weighs 9 pounds.

One cubic foot of pressed hay weighs 25 pounds.

Five hundred and twelve cubic feet of hay weigh one ton in mow.

Two cubic feet of sound corn in ear will make one bushel of shelled corn.

One cubic foot of ice weighs 57½ pounds, and sustains a weight of more than 1500 pounds in its natural position.

In building ice-houses allow one ton of ice to thirty-four cubic feet of space. An acre of ice one foot in thickness will yield about 1300 tons.

To find the number of bushels of carrots or mangolds in a bin multiply the length, breadth, and thickness together, and this product by 8, and point off one figure in the product for decimal.

One cubic foot of water measures 8 gallons and weighs 12 pounds.

One quart of milk weighs 2.15 pounds.

NUMBER OF PLANTS FOR AN ACRE.

1 foot by 1 foot	43,560
1½ feet by 1½ feet	19,630
2 feet by 1 foot	21,780
2 feet by 2 feet	10,890
2½ feet by 2½ feet	6,960
3 feet by ½ foot	29,040
3 feet by 1 foot	14,520
3 feet by 2 feet	7,260
3 feet by 3 feet	4,840
3½ feet by 3½ feet	3,555
4 feet by ½ foot	21,780
4 feet by 1 foot	10,890
4 feet by 2 feet	5,445
4 feet by 3 feet	3,630
4 feet by 4 feet	2,722
30 feet by 30 feet	48
33 feet by 33 feet	40
40 feet by 40 feet	27

IRRIGATION.

In a country like our own, containing every variety of soil and climate, and subject to the most variable degrees of rainfall in its different parts—a country of abundant sunshine, a land of streams and great lakes, and yet subject to the severest drouths, extending over large areas—a land, too, where there is a greater waste of fertilizing material than in any other part of the civilized world—in such a country the need of irrigation is great and continually growing.

Drouths occur annually, of more or less severity, in almost every section, while severer drouths occur periodically every third year, and still greater drouths about every decade. Again, large portions of our western domain are under a state of perpetual drouth, but only require that the mountain streams and the mighty rivers of the great valleys be made to flow over them to induce the highest state of fertility.

It is a grievous thing to hear a wail of complaint from every quarter of the land during a time of drouth, while every portion of the country is intersected with brooks, rivulets and mighty floods of water running unheeded and unused to the unfilled sea.

An incident will illustrate how a small stream may sometimes be utilized. On my native homestead, in Connecticut, there flows a small trout-brook, and on one occasion, during a time of the severest drouth ever known in that part of the country, we had a field of corn bordered by the brook. At the time when the maize should have been making its most rapid growth, instead of waving its broad fresh leaves in every breeze, it began to wilt and lose its color, rolling up its leaves, and not receiving moisture enough from the air to allow them to unroll at night. In such a case the maize crop becomes worthless in a few days, unless it can be saved by irrigation. There was an abundant flow of water in the brook, and it was but the work of a few minutes with a shovel and pieces of boards to construct a suitable dam. In a few hours the whole field was saturated to the depth of about six or more inches, when the dam was taken up and the stream allowed to go its way. The result was a crop of one hundred bushels of ears to the acre when other fields unirrigated had a yield so small as to be scarcely worth harvesting.

Water.*

"This most important of all liquids occurs in nature in all the three states of aggregation which substances are capable of assuming.

"In its solid state, as ice, and in its liquid form, it covers at least three fourths of the entire surface of the earth. It constitutes about three fourths of the weight of living plants and animals, and enters largely into the composition of many mineral matters. In a gaseous form it continually evaporates from the surface of the earth, rises as watery vapors, which, in the colder regions of the atmosphere, become condensed into clouds, and is, without doubt, the most abundant substance we meet with on the face of the earth. It is never found in nature in a state of perfect purity; but pure water can easily be obtained from almost any kind of natural water, by the simple process of distillation. Distilled or pure water, on evaporation, does not leave the slightest residue, and none of the ordinary chemical tests produce any change in its appearance. Pure or distilled water, from whatsoever natural source

* Morton's Encyclopædia, Professor August Voelcker.

it may have been obtained, invariably is a chemical compound of two simple or elementary gases, hydrogen and oxygen. Every nine pounds of water always contain eight pounds of oxygen and one pound of hydrogen ; or in one hundred pounds of water there are 88.88 pounds of oxygen and 11.11 pounds of hydrogen.

"Water freezes at 32° Fahr., or at 0° Celcius, and 0° Réaumur, and boils, and becomes converted into watery vapor or steam, at 212° Fahr., or 100° Celcius, or 80° Réaumur. The evaporation of water, however, not only proceeds at an elevated temperature, but takes place, under favorable circumstances, at all degrees of heat; and even in the form of ice, water slowly, it is true, but steadily, evaporates on exposure to a dry atmosphere. The rapidity with which water is changed into vapor depends mainly on the temperature of the surrounding air, its degree of dryness (its hygroscopic condition), its amount of pressure, and the speed with which the air, charged with watery vapors, is replaced by a dry current. Thence the drying effect of a hot sunshine and of a strong and dry wind.

"During the evaporation of water a considerable amount of cold is produced, arising from the circumstance that water, in a gaseous state, contains a much larger amount of *latent* or imperceptible heat, *i.e.*, heat which is not indicated by our thermometers. The heat necessary to change liquid water into vapor is abstracted from surrounding warmer bodies, and consequently we feel the sensation of cold.

"Thus we are liable to catch cold when we sit down in wet clothes, but seldom feel any inconvenience from a shower of rain which may have surprised us, if we take strong bodily exercise, and thereby supply the heat which is removed from our bodies by the evaporation of the moisture from our wet garments.

"The atmosphere always contains water in an invisible form, and is capable of keeping in perfect solution a larger quantity of moisture at a more elevated temperature than at a lower.

"Water is not merely indispensable to animal and vegetable life, but also to the very existence of many purely inorganic compounds.

"The principal varieties of natural waters are: rain water, well-spring water, river water, sea water, and mineral waters.

RAIN WATER.

"Rain water, having undergone a kind of natural distillation, especially when collected in remote country districts, is the purest of all natural waters. On evaporation it scarcely leaves a trace of fixed matters, and is contaminated only with minute traces of impurities, which the rain washes out of the air. The rain water collected in towns is less pure. Besides the usual atmospheric impurities, such rain water contains organic and inorganic matters which the rain washes out of the frequently dense, smoky town atmosphere, or dissolves from the roofs of houses. The organic

impurities impart unto it a yellowish color, more observable in water kept some time.

"The same impurities are likewise the cause of the putrid smell which such rain water assumes on keeping.

"The more important of the gaseous impurities collected in rain water are carbonic acid and ammonia, and, especially during thunder-storms, nitric acid. They are washed out of the air by the falling rain, and, as might be expected, the first shower contains a larger amount of carbonic acid and ammonia than the rain which descends after a succession of rainy days.

"The amount of ammonia in the air is ever variable, and for that reason rain water cannot contain always the same quantity of this valuable fertilizing substance. At any rate, the amount of ammonia and nitric acid in rain water is so small that at least twenty gallons are requisite for ascertaining their relative proportions. From the average results of M. Barral's analyses of the rain water collected at Paris, it has been calculated that in the course of a year the following quantities of nitric acid and ammonia are brought down from the air, by the rain falling, on every English acre:

	Lbs.		Nitrogen, lbs.
Ammonia	12.29	=	10.69
Nitric Acid	41.24	=	10.12

"Supposing our annual rainfall to be twenty-eight inches, according to Professor Way's analyses, the following amount of ammonia and nitric acid would be poured down yearly on every English acre:

	Lbs.		Nitrogen, lbs.
Ammonia	28.59	=	23.54
Nitric Acid	68.91	=	17.88

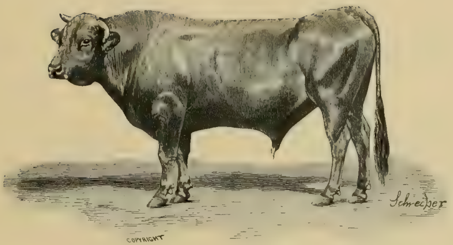
"It thus appears that the rain which falls in a year conveys to the soil a considerable quantity of two of the most beneficial fertilizers.

WELL-SPRING AND RIVER WATERS.

"Water being a solvent for many mineral and organic matters, necessarily must become contaminated with some of the materials of which the strata are composed through which it flows; and as different strata are composed of a variety of mineral matters, differing greatly in solubility, spring water, according to the nature of the rocks and soils through which it passes, must always contain a smaller or larger quantity of various mineral substances.

"Sometimes spring waters contain so large a quantity of mineral substances in solution that they acquire a saline taste—they are then called mineral waters.

"The purest kinds of spring waters are those which rise in granite districts, or in

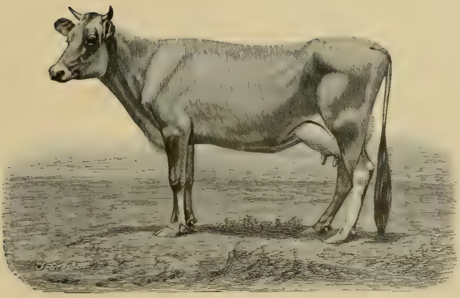


DUKE OF DARLINGTON 2460.

Alphea-Rioter Type.

DARLINGTON HERD.

A. B. Darling, Ramsey's, New Jersey.



PEDRO ALPHEA 13,889.

AT 4 YEARS OLD.

Test, One Day, 3 lbs. 11 oz.

Eurotas Type.

FAIRVIEW HERD.

G. AND H. B. CROMWELL, NEW DORP, P. O. STATEN ISLAND, N. Y.

localities abounding in sands and rocks, which are principally composed of silicious elements. One of the purest natural waters is that of the Laka, in the north of Sweden. It contains only one twenty-sixth of a grain of solid mineral matter in the imperial gallon, and is admirably well adapted for the making of filtering paper.

"On the other hand, water which rises in calcareous districts, or which flows over soils and rocks abounding in lime, is very impure, as it contains invariably a large quantity of mineral matters, more especially lime.

"The drinking-water of Cirencester contains about forty-four grains of solid mineral matters to the imperial gallon, and some other waters a much larger quantity.

"Good drinking-water ought to be perfectly clear, colorless, odorless, tasteless, and uniformly cold at all seasons. The presence of much organic matters renders water disagreeable to the taste, and unwholesome. Inattention to this circumstance has often been productive of serious and fatal disease. Well water is liable to become contaminated with these injurious impurities.

"In sinking a well, the neighborhood of farm-yards, grave-yards, and all places where refuse matters accumulate ought to be avoided, particularly if the soil in the locality is silicious, or of a porous nature, which favors percolation of the surface water. This also shows how desirable it is to prevent the accumulation of the droppings of animals in open yards; for not only will the rains that fall upon them wash out their most valuable constituents, and thus deteriorate the value of the manure, but the well water in the neighborhood is liable to become adulterated with unwholesome impurities.

"In all well-manured and porous soils the organic substances of the manure give rise to the production of nitrates, a class of compounds remarkable for their high fertilizing powers.

"The use of leaden pipes for conducting drinking-water ought to be avoided. Should the water assume a decidedly brownish or black color on the addition of sulphuretted hydrogen water, it may be inferred that it contains in solution a quantity of lead which cannot be introduced in the human organism without causing the most serious consequences.

RIVER WATER.

"Like spring and well waters, river waters contain a variable quantity of solid matters; but, generally speaking, river water in most instances is softer than the well or spring waters in its neighborhood, and for this reason it is better adapted for general purposes than spring or well waters.

"Carbonate and sulphate of lime, or gypsum, constitute the chief portion of the solid matters which are left on evaporation; besides these compounds, ordinary spring, well and river waters usually contain variable quantities of common salt,

sulphate of soda, sulphate of potash, carbonate of magnesia, silica, iron, alumina, phosphoric acid, and organic matters.

"River waters generally hold variable quantities of suspended matters, dependent upon locality and state of weather; and thereby are rendered more or less turbid or muddy.

"The particles of suspended matters do not always readily subside, and river water, for that reason, must usually be filtered, or otherwise purified, before it can be employed for domestic purposes. Thus even unwholesome and turbid water, by the use of the water-filter, can be rendered wholesome and clear.

"Simple filtration, however, does not remove to any extent the several constituents contained in natural waters, and cannot, for this reason, be resorted to for the purpose of rendering a hard water soft.

IRRIGATION WATER.

"Prejudicial as are the organic impurities in water to animal life, they materially benefit the growth of plants; consequently a water intended to be used for irrigation will be all the better for containing a good proportion of organic substances. Hence no water is so useful for irrigation as sewage water, or a natural water into which the sewage of towns finds its way; for water of that description invariably contains a considerable amount of putrefying animal and vegetable remains, partly in a state of perfect solution, partly in suspension. But as many natural waters are employed for irrigation with much benefit, although they contain mere traces of organic substances, the beneficial results attending irrigation cannot be due entirely to the organic matters deposited on the soil in the passage of the water over it. The inorganic substances contained in all natural waters certainly must contribute to their general beneficial effects; for several of the mineral constituents of spring and river waters are known to be excellent fertilizers.

"There are few natural waters which do not contain an appreciable quantity of salts of potash and soda, sulphate of lime, and soluble silica; and as all these compounds are calculated to promote the healthy and luxuriant growth of plants, most natural waters must exercise a beneficial action on vegetation, partly on account of their mineral constituents. In many waters known to be well adapted for irrigation we have also detected a small amount of phosphoric acid, or, more correctly speaking, of phosphate of lime or bone-earth; and though the percentage of phosphoric acid in water is but trifling, yet, considering the large quantities which run over irrigated land, an absolute amount of phosphate of lime is conveyed on it, which is equivalent to a good dressing of bones.

"Some natural waters are much richer in alkaline salts than others, and perhaps, partly for that reason, some kinds produce a more marked effect on vegetation than others.

"However, we believe the beneficial effects attending irrigation cannot be referred entirely to the organic and inorganic fertilizing substances which all waters contain. But as we are not inquiring into the full causes of these effects, and are only speaking of the qualities of irrigation water, we shall content ourselves by observing that there is scarcely any natural water, however poor in solid matters, which cannot be employed with advantage for irrigation purposes.

"While experience teaches that all ordinary spring and river waters are capable of being employed with advantage by the irrigator, it also informs us that some kinds of natural waters produce much more striking effects on vegetation in irrigation than others.

"As a general rule, it may be stated that the value of a water, for the purpose of the irrigator, depends first and chiefly on the quality, and second, upon the quantity of the solid matter it contains.

"The streams or springs which flow from or over limestone districts, and especially those which have their origin in the lower strata of limestone rocks, are particularly characterized by fertilizing properties. In the opinion of many practical men it is the lime in these waters which causes the green, fresh, and luxuriant appearance of the herbage; and lime, consequently, is regarded by them as the most valuable ingredient of the water. Lime, no doubt, is a useful fertilizing agent; and water containing a considerable proportion of this substance necessarily must exercise a highly beneficial action when allowed to flow over land naturally deficient in lime.

"Most soils, however, contain proportions of lime amply sufficient to supply all the wants of the growing plant; and almost all natural waters, likewise, contain this substance in considerable quantities.

"In the majority of cases we are not warranted to ascribe to lime alone the whole or even the principal share of the chemical influence which water may exercise when employed for irrigation. Now the springs which rise in the lower strata in limestone rocks we have ascertained invariably contain proportions of alkaline salts and phosphoric acid which are larger than those usually found in natural waters; and as alkaline salts and phosphoric acid belong to the most valuable fertilizing substances, we are inclined to ascribe the superior fertilizing action of these waters, as far as is dependent on chemical substances, not to the presence of lime, but to that of a considerable proportion of alkaline salts and phosphoric acid."

WATER-MEADOWS.*

"Watering meadows, or the system of applying liquid to further the growth of the permanent grasses, is a custom very peculiarly localized, both in England and on the Continent.

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* Morton's Encyclopædia, Hugh Raynbird.

"While in the latter we see irrigation practised largely in hot climates, as in the south of Spain, in Persia (whence the Persian wheel), in China, where the mechanical contrivances for this purpose are ingenious, though simple; and in Egypt, where the natural and annual irrigation of the Nile leads to productive harvests; yet, with the exception of the rich meadows of Lombardy, and in the mountain slopes of Switzerland, we find that this irrigation is confined principally to the growth of vegetables and the cultivation of grain crops, and does not come under the view of water-meadows.

"In England we find the custom of watering confined to a few of the southern counties; for although successful instances (some of them on a large scale) may be found in other districts, they are only the introductions of large landholders, and come under the head of experiment rather than practice.

"I shall briefly mention the English counties that excel in irrigation. These are: Wiltshire, with its water-meadows on the Avon, and its celebrated Orchiston meads, which are known under the title of the Long Grass Meadows, the crop of hay on which is enormous; Hampshire, with its meadows upon the Avon, the Test and the Itchen, so useful to flock-masters from their vicinity to the Downs and their early produce of herbage for ewes and lambs; Gloucestershire, on the banks of the Severn, Avon and Ledden. Worcestershire has water-meadows on its numerous rivers and small streams, and in many instances the water is brought from a considerable distance by canals, which supply several farms on one estate.

"Dorsetshire possesses six thousand acres of irrigated meadows, including some of the very richest in the vale of Blackmore, watered by the river Stour.

"Devonshire has its hillside or catch meadows, as also many water-meadows, on the alluvial borders of the principal rivers.

"Berkshire has valuable meadows along the river Kennet.

"It is probable that the total quantity of land under this cultivation in England is under one hundred thousand acres, a very small proportion of those tracts that might be improved in this way.

"The most celebrated Wiltshire meadows are on a loose bed of broken flints, with scarcely any earth; the water above feeds the grass. The Hampshire rivers have a hard bottom subsoil of chalk, and the water runs over a gravelly or peaty surface. It seems only necessary that the subsoil should be porous, and the surface soil may be what it will on thoroughly well-drained land; probably it is not of primary importance what the constituents of the soil may be, although the best and healthiest meadows certainly occur where the soil is porous and dry.

QUALITY OF WATER.

"Water which is productive of fish, particularly trout, is generally supposed to be good for water-meadows. Experience seems to declare that, for grass land, the

clearer the water the better; that calcareous matter taken up in a form not to render the water turbid is almost the only beneficial admixture.

"When the rivers are turbid from quantities of silt, or of finely divided clay and peat, they injure the grass, especially the former; but streams flowing clear and pure from the hills are of benefit, and especially from hills abounding in lime. But admixture with other soils injures them; as, for instance, in Staffordshire, where the river Dove, flowing from calcareous hills, so enriches its neighboring mead that it is proverbially said: 'In April Dove's flood is worth a king's good;' but when admixed with streams from other sources its benefit ceases.

"On arable land the more thick and turbid the water the better. The Nile water is thick, and the water used in warping land even more so. The Humber, in Lincolnshire, is famous. The basis of the warp soil of this river is fine clay and sand, the latter in the greater proportion, and minutely divided and intimately mixed with the former, with a considerable portion of fine calcareous earth.

"Though not suited for water-meadows, it is probable that warp land, if laid down to grass, would form very fertile natural ones; in fact, it is the mode in which all our rich alluvial meads were originally produced.

"But though an admixture of natural earth with the water is not beneficial, yet that of dissolved animal excrement is. All water is weak liquid manure, and although it might not be economically practicable for every farmer to lay down a water-mead, on the system of Mr. Mechi, of underground iron pipes and steam pumping power, or even advisable, except in particular instances, to imitate the cheaper mode common in Switzerland, and sometimes practised in Cheshire, and also in Devonshire, of turning a rivulet so as to flow through a farm-yard, and thus irrigate meadows situated lower down; yet the example of the Edinburgh meadows shows with what great success liquid manure may be applied to grass, as does the experience of Mr. Dickenson and others with Italian rye grass.

HERBAGE PLANTS SUITABLE FOR IRRIGATION.

"This is a subject which deserves more attention than has yet been applied to it. The nature of the grasses for water-meadows has not been studied, but it has been left to accident to produce and circumstance to alter.

"In Lombardy greater care is taken.

"The Italian rye grass is the principal kind cultivated under this system. It is a native of this district of Italy, and perhaps its larger size originated from its being thus peculiarly cultivated, just as the timothy grass is only an enlarged American variety of the common cat's-tail grass, improved by cultivation and the influence of change of soil and climate. No grass produces earlier or more abundantly under irrigation, and Mr. Rham, in his *Dictionary of the Farm*, mentions having seen an

instance of hay made in July from a newly-made water-meadow sown with Italian rye grass in March.

"A Mr. Dickenson, in a letter addressed to the Duke of Richmond in July, 1847, after mentioning that his land was strong clay, thoroughly drained and well pulverized, and sown with Italian rye grass at the rate of four bushels to the acre, mentions that in 1844 he cut a crop 'the first week in March, with about ten inches of grass; April 13th cut the second time; May 4th the third time; May 24th the fourth time; June 15th the fifth time; July 22d the sixth time, with ripe seed, and three loads of hay straw to the acre. Immediately after each of these crops the land was watered at once, from a London street water-cart, with two parts of pure urine from the stables and one part of pure water, the produce of each crop increasing with the temperature of the atmosphere, from three fourths of a load per acre, as hay, to three loads per acre.' The land was not watered any more, yet produced four light crops afterward, making ten cuttings in the course of a year.

"In this experiment we may notice the strength of the manure, and also that the crop increased with the temperature of the air. This last is a fact that shows why watering is only useful in hot climates, and accounts for its being almost entirely confined to the southern counties of England, and not practised in Scotland.

QUALITY OF THE GRASS.

"This is a subject not unworthy of notice; for its increased produce is little gain if, from its laxative and too succulent nature, it produces diarrhœa in young animals feeding on it, though this may be corrected by giving good hay.

"Although the introduction of water-meadows into a district where before unknown is desirable, yet the introducer must not overlook the difficulties or reasons that prevent such having been previously attempted.

"Climate must be considered, nature, and plentifulness of water—and even where plentiful not obtainable, being monopolized by mills; nature of soil in which to be applied; and, if all these are suitable, nature of the country; for one must consider how to take water off as well as how to get it on, and a flat country may have greater difficulties in the latter point than a hilly one to overcome the obstacle of its declivities. We must recollect that all English counties where water-meadows are in vogue are hilly, and all these have a rocky, and at least a fissured subsoil, which collects the water in springs, so as often merely to require easy direction.

"Where land is favorable for water-meadows it cannot better be described than in the words of Mr. Pusey: 'A slight film of water trickling over the surface—for it must not stagnate—rouses the sleeping grass, tinges it with living green amidst snows and frosts, and brings forth a luxuriant crop in early spring, just when it is most wanted, while the other meadows are still bare and brown. It is a cheerful

sight to see the wild birds haunting these green spots among the hoar-frost at Christmas; or the lambs, with their mothers, folded on them in March. A water-meadow is the triumph of agricultural art, changing, as it does, the very seasons.'

RIDGE-AND-FURROW IRRIGATION.

"The streams are diverted by means of hatch-work, and the water runs in small gutters or carriers along the tops of the ridges into which the land is shaped, and is made to flow over the entire surface, and falls into another series of gutters, which convey it away, either to the river from whence it came, or to serve the purpose of irrigating meadows that are lower down the stream. The best meadows are those upon a gravelly soil, with a good drainage; the latter is a matter of great importance, although seldom sufficiently attended to in the formation of meadows.

"In extreme cases, where other methods cannot be adopted, the main body of water need not be diverted from its proper channel when it passes from the meadow; but a small drain, with an outlet at a sufficient distance down the stream, generally below a mill, may be opened to convey away the soakage water, the mouth of this drain being, of course, closed when the meadow is watered.

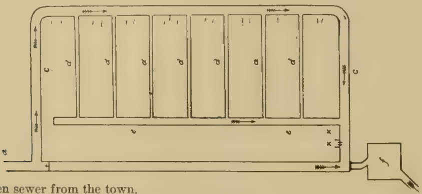
"The process of floating the meadows is intrusted to the care of a man who makes this kind of work his regular employment, and who is usually paid at a certain rate per acre per year for taking charge of the meadows upon one or more farms. He commences in the autumn, by clearing out the gutters, and as soon as the water is turned on he regulates the stops and edges of the gutters, so as to insure an even and regular flow of water over the surface of the meadow. Injury results if the water is allowed to stagnate in any part, or if it remains on too great a length of time; it is therefore turned off and on at short intervals.

"A succession of feed is secured by commencing watering a portion of the meadows upon a farm earlier than the remainder. Some even do not turn the water on till after Christmas, but then the early feed is lost altogether. Upon the best meadows grass is ready to be folded about the middle or end of March, the water being turned off a few days previously. The grass is fed with ewes and lambs, the latter having a run forward; they are not, however, allowed to remain entirely on the meadow, but are removed to a piece of Swedes, or other feed growing upon arable land, at night. When the grass is all fed the watering is again renewed, as before, and is continued until a short time before the grass is in readiness for the scythe, usually at the end of June or beginning of July. The great bulk of the succulent herbage, and the natural dampness of the situation upon which it grows, occasion the process of hay-making to be one that requires much care and attention. The meadow is again watered, and the aftermath fed off with horses and cows, few meadows being safe to feed sheep upon in the autumn.

SEWAGE IRRIGATION.

"The meadows watered with the sewage of Edinburgh afford the best, though in many respects imperfect, examples of the advantage to be obtained by the use of the offscouring of our towns for agricultural purposes.

"The method of application is simple, but it has proved successful, when compared with the elaborate and expensive methods tried in other quarters at present, unfortunately, however, without proportionate results. Although the irrigation is carried on only upon a small scale, and the means used are imperfect—a great quantity of manure running to waste—yet the results appear truly extraordinary. The following sketch will roughly illustrate the method adopted upon a meadow at Lochend farm:



a, The open sewer from the town.

b, Sluice for turning the sewage into the carrier *cc*, which has stops at intervals to turn the liquid into the small carriers *dd*, which are about ten inches by ten inches, having stops to throw the manure water regularly over the grass, to facilitate which small cuts are also made with a spade at the edge of the carriers.

f is a settling-tank into which the liquid runs, having a dam and grating at one end, which prevents the solid portion escaping; as it accumulates it is removed.

ee is a drain which carries off the waste water, both from the surface and underground drains.

"Of course it will be understood that the wonderful results of this liquid manuring are dependent on other causes than those to which the fertility of the ordinary water-meadow are due. The gross and rapid growth of Lochend meadows is owing simply to excessive manuring; that of English water-meadows may be in a measure attributable to the efficient and rapid supply of food to the grasses by running water; but also, no doubt, in part to an improved temperature—and even if this were not one of the operating causes, feeding by a rapid flow of clear water is very different from the mere drowning of land in thick and sluggish liquid manure.

"At Quarry Hole Farm a meadow of six or seven acres is somewhat differently arranged, with very similar results:

"The liquid, very strongly impregnated with sewage matters, is turned on these meadows for three or four days at a time, at intervals. After mowing, the water is not turned on for six or seven days, or it will rot the roots of the grass.

"The enormous prices given by the Edinburgh cow-keepers for the produce of these meadows is the best evidence of their value.

"The grass is sold in half-acre lots by public auction, and realizes from £30 to £50 per acre: the grass is cut four or five times by the purchaser, and left clear by the 20th of October.

"If such results as these are obtained by the simple means in this case employed to distribute the town sewage, we have reason to anticipate far greater advantages, both in an agricultural and sanitarial point of view, from the more modern means of distribution by the hose and force pump, the practicability of which, for the application of sewage as a fertilizing agent to our fields, is so well and clearly illustrated by Mr. Mechi at Tiptree Farm, and by other spirited agriculturists, and recommended by them as a system far more in character with the improvements of the advancing age than the one just described; and, we do not doubt, for the application of town manure experience will prove it to be such.

CATCH MEADOWS.

"Catch meadows have the great advantage over ridge-and-furrow meadows of cheapness of formation: the same quantity of water will suffice to irrigate a larger surface, falling as it does from tier to tier of gutters. The hillside affords a more natural surface for the water to flow over than that which is given by the artificial and expensive ridge-and-furrow.

"Philip Pusey gives a very good account of catch meadows in the *Journal of the Royal Agricultural Society:* 'It is to the southwest we must turn, to Somerset and to Devonshire, for patterns of future irrigation. In these two lovely counties, which have the valleys without the Alps of Switzerland, abundant streams roll cheerfully in a rapid descent over stones, or among mossy rocks, and the sheltered sides, shelving rapidly upward, have long since tempted the farmers to lead water along their sloping face in tiers of channels, each of which, receiving the overflow from above as it begins to gather irregularly, receives it in a level trough, to brim over anew, until it reaches the lowest channel, which delivers it back to the river's bed.

"'The horseman, as he rides along, sees meadows of a few acres rising above his head, bright as emerald, glistening against the sun with their thin film of water, alternating with orchards in which cottages are nestled that seem to cling to the hill, with a canopy of oak copse above, whose russet leaves, a remnant of the last summer, look the ruddier against the narrow space of blue sky that roofs in the glen. These are called catch meadows because each trench thus catches the water from its neighbor above it.'

"Mr. Pusey also quotes examples of catch-work upon level meadows being carried out successfully at a small cost.

"An improved system of irrigation is also described in the *Journal* by John Bickford, of Crediton, Devon, which is also well worthy of perusal by those requiring information on the subject.

"The following monthly directions for the management of water-meadows are given from Boswell Wright, and from original observation.

"But such directions for this and all other agricultural operations depend on the *natural*, not on the nominal season. Those here given are for an average year, and must be altered to suit one more forward or backward, an extraordinarily mild winter, or other peculiarity of time or climate.

JANUARY.

"The land should be floated in frosty weather to protect the grass; but about once a fortnight air must be given, and the land laid as dry as possible for a few days.

"If the frost has given a complete coat of ice to the meadow, do not float over this, as the attachment of the ice to the surface often draws the soil into heaps and injures the evenness.

FEBRUARY.

"In this month the meadows require much attention. If the water is allowed to flow over the grass several days without intermission a white and very injurious scum is formed; and if the water is then drawn off, and a severe night-frost attacks the wet grass, it cuts off the herbage. To prevent this scum take the water off by day and lay it on at night, to avoid frost. A less troublesome but inferior plan is to take the water off early in the morning, if a dry day, and let it remain off several days and nights; for one day's drying is sufficient to enable the grass to resist frost. From the middle of this month water is applied more sparingly than in winter, and more to encourage vegetation than to protect from frost; and in the last week of the month there probably will be a good bite for ewes and lambs.

MARCH.

"At the beginning of this month old floated meadows will supply abundant food to all kinds of stock. If heavy cattle are turned in the water must be taken off for a week previously, to allow the land to become firm and dry. If the season be cold in the first week give a little hay in the evening, to correct the effects of too moist food. But the grass is best applied for ewes and lambs, and should be hurdled off for them in portions. Peat soils would be damaged if heavier stock than sheep or calves be turned on thus early.

APRIL.

"In this month the use of meadows for ewes and lambs is still greater than in March, and the farmer who possesses a good breed of them will require little else

for their keep; but it must be recollected that they must not be on longer than this month, or the hay crop will be much injured.

MAY.

"Remove ewes and lambs and calves the last day of April: the meadows will be fed bare, and most farmers consider that the barer the ground is left, so much more is the meadow improved, and the quality of the hay superior.

"After clearing water for a week, carefully examine every trench and drain, and so shift the water into other meadows that the land is alternately watered and drained, and the time of the water remaining on the land shortened as the weather gets warmer.

"In five, six, or seven weeks the meadows will be fit to mow for hay.

"This is also a good month for forming new water-meadows, though any time of the year, unless during severe frosts, will answer for the work.

JUNE.

"Mow and make hay. The grass, being of a more succulent nature, requires more careful making, and is more subject to heat if not got up in good order.

"As soon as the grass is off turn in cattle (not sheep) to eat the grass left by the mowers and what grows in the trenches. Then let the water dribble on them as slowly as possible, this being the hottest season of the year; and after two or three days shift this first watering to another meadow. The effect will be very great, and the verdure, compared with unwatered meadows, exceedingly rich; but recollect not to keep water on too long in warm weather, or a white substance like cream is produced; and if this is neglected a scum as thick as glue, and nearly as tough as leather, settles on the grass, and quite destroys it.

JULY TO OCTOBER.

"Where the meadows are fed late the beginning of July is the season for making hay on the water-meadows, which, we have before remarked, is an operation requiring much care and attention; after which the watering is renewed for a short time, and the aftermath fed off with cattle.

NOVEMBER AND DECEMBER.

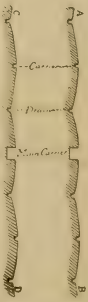
"Begin to water the meadows; frequently water can be collected in the higher parts of the farm sufficient to water some of the low meadows, and, by attention to the ditches and water-courses, a free passage can be given from that portion of the farm where injurious to that where it would be highly beneficial and more productive than a coat of manure. It is best to keep the water running over the grass, and not to allow it to stagnate.

RIDGE-AND-FURROW GROUND PLAN OF A WATER-MEADOW.

Scale of 40 yards to 1/10ths of an inch.

Light lines, Barriers; black lines, Drains. *a*, Hatch across river; *bb*, Hatches to water lower stem; *cc*, Small hatches to draw off the water when the meadow is laid dry. Dotted lines, Barriers from the main drain of the meadow above, by which the irrigation may be continued lower down the stream, the water being penned up by the two small hatches *dd*. Small stops of turf are placed in the small carriers at intervals of about fifteen yards, or as required, to make the water flow regularly over the surface of the meadow.

MILANESE IRRIGATION—LOMBARDY MEADOWS.



"In Lombardy neither sheep nor cattle are fed upon the meadows, but the entire produce, whether of permanent grasses or clovers, is mown and used for soiling cattle in stalls. Manure is applied to the meadows, and, as they are not trodden by cattle, their surface is kept smooth with mathematical correctness.

"We believe this example might be followed with advantage, particularly near the towns, where the produce of grass would be of so great value. Signor J. Devincenzi, an Italian gentleman, has favored me with the following details on the Milanese system of irrigation. He considers that irrigation is neglected in England; and that many of our canals, now rendered almost useless by the introduction of railroads, might be employed, at little expense, both to fertilize tracts now cultivated, and to bring land altogether waste into profitable cultivation. He also considers that the common idea, that the Milanese system is unsuited to England, from the difference of climate of the two countries, is erroneous; for, taking as an instance the work of Professor Dove, of Berlin, and referring to his maps of the isothermal line of the globe

for each month, we shall find that Milan and England possess the same temperature during the months of January, February, November and December; and during these months the Lombards mow their meadows, called *marcite*, twice or thrice, while in England no such result is obtained.

"No doubt the summer temperature of England is far lower than that of Lombardy, but it may be questioned whether this is not an advantage in the production of grass; and yet in Lombardy they cut eight or nine crops yearly from a meadow.

"Signor Devincenzi's opinion ought to possess some weight, as he has written on the subject, is secretary to the Italian committee on irrigation, appointed by the Milanese Scientific Association, and was reporter to a committee on Milanese agriculture, consisting of first-rate Italian agriculturists, from whose report, so far as relates to irrigation, the following is an abridged extract:*

"'In the province of Milan, as well as the rest of Lombardy, there exist two widely different systems of agriculture, both exceedingly well calculated to suit the varying circumstances of their localities.

"'In Upper Lombardy we find small occupations of arable land, tilled by an industrious population of peasantry; in Lower Lombardy extensive water-meadows, held by wealthy tenant-farmers. If we draw a line from west to east, dividing the province of Milan into two parts, and passing through the capital, we shall very nearly show the correct division of the upper and lower part. In general the cultivation of the land surrounding great cities must be considered by itself, as being quite different and inapplicable to the rest of the country or district; yet that surrounding Milan is but a type of Lombardese valley agriculture, and consists almost entirely of meadows, the tilled land being so small in quantity that it is scarcely worth mentioning.

"'These meadows, though very ancient, are in a most thriving and flourishing condition, and the labor employed in them is merely that of regulating the supply of water and levelling the ground, the grass being that naturally produced by the soil. The meadows lying on the south are irrigated by the sewage water from the city, receive no other manure, and are cut seven, eight, and in many instances nine times a year. Those on the north, partly from copious manuring and partly from spring water, there called *fontalini*, are but little inferior to the former.

"'Winter water-meadows, in the country language, are called *marcite*. They are watered every sixth or eighth day in the summer, and are continually covered by a sheet of flowing water in the winter. By this means vegetation is so encouraged that from November to March two or three abundant crops are cut, so that the cattle fed from and upon them are not deprived of fresh fodder more than thirty or forty days in the year. The rate at which these water-meadows are commonly let in the neighborhood of Milan is from twenty to twenty-five francs a *pertica*, or

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* Report on Milanese Agriculture.

from £5 to £6 sterling per English acre. The water is applied in summer on meads and all kinds of cultivated plants, as required in winter on the *marcite* only, of which there is sufficient to employ all the water, so that it never runs to waste.

" 'The Lombardese irrigation is worthy of praise, as it has converted what would have been barren sands and unhealthy marshes into fertile meadows, and as combining irrigation, drainage, navigable canals, and motive power for mills and machinery in such a manner that one object does not, or only in a slight degree, interfere injuriously with the other. The Lombardese customs and legislation on irrigation are also deserving of notice and imitation.

" 'Still it must be remembered that Lower Lombardy possesses a peculiar adaptability to irrigating purposes in its immense valley, in the vast reservoirs *above*, the lakes resting on the heights of the mountains, and in a river to carry off the superfluous water.

" 'The farms in the Lower Milanese are generally from two thousand to three thousand *pertiche* in extent (three hundred and thirty-three to five hundred English acres), and they are commonly let on leases of from nine to twelve years. Some of these farms are, from the tenacious nature of the soil, suited for the cultivation of rice. Nearly one tenth is laid down as permanent meadow, and of this very nearly one half is cultivated as winter meadow or *marcite.* The ordinary meadow is manured once every year, the *marcite* often twice; and although water from springs is, from its warmth, the fittest for winter irrigation, *marcite* are nevertheless made with any other kind of water. In the other part of the territory, if the soil be proper for the growth of rice, a nine years' rotation is employed. In the first year wheat is sown with *Trifolium pratense*, which supplies abundant pasturage in the autumn. Manure is applied in the second year; and the *Trifolium repens* and other useful plants spontaneously succeed the *Trifolium pratense* during the third and fourth year, in both which years manure is applied.

" 'In the fifth year the soil is sown partly with flax and partly with maize. The part sown with flax is followed the same year either with millet or with maize *quarantine*, so called from requiring, from its germination, only forty days to grow and ripen in.

" 'In the sixth year maize is cultivated with manure. In the seventh, eighth and ninth years rice is sown, in the last two years with manure. On the fields where rice is not grown the same rotation is practised as for the first six years. Thus in the first rotation the soil is manured six times in nine years, and in the latter four times in six years.

" 'It would be interesting to compare the relation that different kinds of cultivation have to one another, and that which the meadow bears to them all. The Lombard cultivators well understand that the latter system augments, instead of

diminishes, the produce of grain. An acre of land produces on an average from twenty to twenty-four bushels of wheat and fifty to seventy bushels of maize.

"'Among the minor products, though still a valuable one of these meadows, is the mulberry, common both in the permanent and other meadows, which, so far from being injured by irrigation, thrives under it. However, this tree is more largely cultivated in Upper than in Lower Lombardy. The hay of all these meadows is used to feed working cattle and cows. The annual rent of each cow is calculated to average from two hundred and eighty to three hundred francs (£11 to £12). This large sum is not obtained solely near large cities, but is common over the district, the milk being employed entirely in the manufacture of Parmesan cheese and butter, that may be carried to any distance. The general rent of farms in the Lower Milanese is from one hundred and twenty to one hundred and eighty francs per hectare (£2 to £3 per acre). To prove the value of this water, let us examine the estimate that the inhabitants themselves put upon it.

"'They reduce all measures of flowing water to a common unit, which they call *onica*. The Milanese *onica* is a quantity of water flowing from a hole nearly one hundred and forty-nine millimetres wide and one hundred and ninety-eight high (0.488 by 0.649 of the English foot), and comprising a little less than one third of the English square foot, under a pressure of ninety-nine millimetres (0.324 of an English foot). Now this water *onica* is generally sold at the enormous price of from twenty-five thousand to thirty thousand francs (£1000 to £1200), and often even more. If, however, we should state often double or triple the rent of the farm, we should still be under the mark.

"'The fertilizing power of water is immense. It changes wild heaths into luxuriant meadows, or, to employ figures, raises the rent of land from a bare thirty or forty francs to three hundred or four hundred.

"'The Lombardy farmer on these meadows is generally a man wealthy and possessed of considerable capital, which he employs with much profit. As a general rule, forty thousand francs are employed on every one hundred hectares of land (nearly £6 8*s*. per acre), which would be nearly three years' rent of the land.

"'In cultivating the soil the farmer employs not only daily laborers, but families of cultivators, who share in the produce; and cultivation on the large scale does not therefore injuriously affect the moral and economical condition of the lower orders, as it unhappily does in other parts of Europe.'"

SAVING OF WASTE MANURES.

The waste fertilizers of the farm consist of the liquid or drainage from the manure heaps, cattle sheds, stables, and the liquid refuse of the dwelling, the gaseous evaporations from fermenting manure heaps and yards, and all animal and vegetable refuse.

Upon large farms, where steam power is used with a system of iron irrigating pipes, so that all the manure of the farm can be distributed in a liquid form, the method is capable of preventing nearly all waste, where it can be adopted. But upon small farms this method cannot generally be adopted.

Perhaps the most economical of all methods is to remove the manure directly from the stable each day to the field when and where it is to be used. This is certainly advantageous if it can be at once plowed in at a depth of from three to five inches. As far as it is practicable this method may be adopted.

As a general plan for the average farm the following method promises to be economical: Select a shaded place on the north side of a wall or building. It would be well to roof it in. Make the space sufficiently large to hold all the manure made during six or eight months, allowing twelve tons for each animal, so as to form a compost couch, and allowing for a depth of from two to five feet. Make the floor of cement or clay, and inclining so that the liquid may run to the front side. Divide this compost couch into two or three compartments by a partition of concrete.

Make a capacious tank, allowing about thirty hogsheads of space for each animal kept, on any convenient side of the compost couch, and connect the tank by drains with the couch, so that the tank may receive all the liquid manure from the compost heaps. Also connect the tank with the liquid manure gutter of the stables and with the house drainage and water-closets. Also connect the tank with the system of spouts that collect the water from the roofs of stables and barns, so that the rain-water may be conducted at will, either to the compost heap or to the tank.

Fix a pump over the tank, so as to provide for pumping its liquid contents upon any and all parts of the compost couch.

These arrangements may be made at moderate expense, and worked with little trouble by the farmer, so as to give him perfect command over his manure, and to concentrate all the manurial elements of the farm in compost or otherwise, at pleasure.

To prevent waste the manure of the stables and yards is daily removed to the compost couch. One section of the couch forms a place of deposit for all the vegetable refuse which can be gathered together.

The gaseous waste arising from too active fermentation may be prevented in the manure heap by compaction and tramping of animals, and also by a liberal wetting daily from the liquid tank. The liquid in a section of the couch can be retained by closing the pipe or sluice which leads to the tank from that section. By covering a section with ashes, peat, or dry earth to the depth of ten inches, and saturating the surface of this covering with sulphuric acid diluted with twenty parts of water, very little ammonia will escape. Thus the couch and liquid-manure tank, both of which must be preserved water-tight, furnish the means of using compost in any condition desired, and also the tank provides a large amount of liquid manure, to be applied by the sprinkling-cart.

DOMINO OF DARLINGTON 2459.

Alphea Type.

BRIARCLIFF HERD.

JAMES STILLMAN, SING SING, NEW YORK.

MISS COOPER 5869.

Alphea Type.

HOLLY GROVE HERD.

JOHN I. HOLLY, PLAINFIELD, NEW JERSEY.

It only remains, for those who desire to be successful cultivators of land, to avail themselves of the means now in their power of remedying a great evil, and of securing and saving a great waste.

IRRIGATION IN CALIFORNIA.*

" The Padres who established the missions here over a century ago are generally credited with having introduced the practice of irrigation, and many of the ditches constructed by them are still in use by the white settlers. In one instance at least, however, in California, a large section of country derives its supply of water for this purpose from a ditch, or *zanja*, which antedates history and presents every appearance of extreme antiquity. In Arizona, too, are found evidences of vast irrigation systems upon lands long since given over to the desert, and which even the traditions of the Indians fail to supply us with anything approaching a history. Several efforts on a large scale have been made to divert the waters of the Salt and Gila rivers upon the plains through which they flow, and, singularly enough, it has been found that the ancient remains of irrigating canals afforded the exact grade and the requisite fall per mile that the best appliances of modern engineering could suggest or construct.

" The common method of irrigation in California may be described as follows: Having settled on a site, which must of necessity be in the vicinity of a running stream, a large triangle is made, having a plumb-line hanging from the apex. With the aid of this primitive appliance a ditch is laid out from the field up-hill at a proper grade, until the stream is reached. When the ditch has been built a rude dam of brush or logs is put across the stream, so as to divert a portion of the water into the mouth of the canal, which is just above the dam. The main ditch is carried across the highest part of the field to be irrigated, so as to have a constant fall from the source of supply to the lower end of the field. Sometimes boxes with a wooden slide are put into the lower bank of the ditch opposite each row of trees, vines or plants. Sometimes one man can attend to twenty or thirty such openings at once, and it is necessary to go up and down through the field and see that the little streams are not lost in squirrel holes, but find their way to the foot of the slope. As may be imagined, this is a very wet and disagreeable job. With grapes, corn, etc., a shallow furrow is plowed each side of the rows, at a distance of a foot or eighteen inches, and through this the water is run as long as needed.

" When alfalfa or grain is to be irrigated the system adopted in the case of large fields is to mark off ' checks ' of five, ten, or twenty acres, with a slight levee, or bank, across the lower end and sides, to keep the water from running off. The ditch at the upper end is then tapped, and the check flooded until the water has reached every part of it.

* G. F. W., in *Country Gentleman.*

"The next check is then operated, and so on until all are supplied.

"The method described is only practicable where the water supply is abundant. It is estimated that where open ditches, with no protection to bottom or sides, are used, from half to two thirds of the water is lost by evaporation and seepage. Many ditches have been lined with stone and cemented, so as to prevent loss by seepage, and it will not be long before they will be also protected from loss by evaporation.

"A very successful method of underground irrigation has been devised, far superior in the end, though more costly in the beginning. Pipes, made of cement and sand, are laid throughout the field or orchard at just sufficient depth to escape the plow and cultivator, with taps or plugs at regular intervals. When desired, these plugs are withdrawn, and the water soaks through the ground beneath the surface, and proves far more beneficial than when applied upon the surface. With the growing scarcity of water other sources of supply have been sought, and these are found in surface and artesian wells. With surface wells windmills are used, and the water is often conveyed by iron pipes laid in shallow trenches to all parts of the ranch. From artesian wells the water is either collected in a reservoir, or it is allowed to run continually, being diverted, as occasion requires, in small open ditches, or little V-shaped flumes. By this means one well, if not more than an inch and a half in diameter, can be made to irrigate a very large tract of land.

"As to the result of irrigating, a few actual experiences may be given. An alfalfa field has been cut by the writer eight times in as many successive months, yielding from two to three tons to the acre at each cutting. After the crop was removed one thorough soaking with water was all that was needed to insure an abundant growth at once. Vineyards yield six, eight, or ten tons to the acre, potatoes eight to ten tons. Barley and wheat at the rate of from forty to sixty bushels, and corn at one hundred bushels or more, are harvested; watermelons of one hundred and seventy pounds on ground that would not produce a spear of grass without artificial moisture, and vegetables of all kinds in like proportion. Although the water may be clear as crystal, and apparently free from any organic substance, its use in irrigation seems to render manuring almost unnecessary. The same soil will produce abundant crops year after year, with no apparent diminution, when not a particle of fertilizer of any kind is supplied to it. Irrigation seems to be all that is needed.

"While the use of underground pipes at the East, or where frosts prevail, might not be practicable, still there is hardly a farm where some source of water supply might not be made available, and by a little expenditure in the construction of open ditches a large portion of the loss from drouths might easily be avoided, as well as largely increased yields secured."

FEEDING CATTLE.

ELEMENTS OF NUTRITION.

Feeding is not alone the means of simply sustaining animal life by nourishment, but the basis of a science which has power to transform and reform races of animals. Breeds are made by feed and selection. For a special breed, like Jerseys, that is to be kept up to a certain standard of milk and butter production, a peculiar system of feeding is required. The food must not only contain all the elements of animal bodies, but it must be given in such form and proportions as to develop the milk and butter qualities in the highest degree.

Plants elaborate the elementary principles into complex structures ; cattle appropriate them in a form especially suited to their needs. The organic elements, oxygen, hydrogen, carbon and nitrogen, which form the combustible parts of plants and animals, with potash, soda, magnesia, lime, sulphur, phosphorus, chlorine, silica, iron, and a few other elements which form the incombustible portions, are all to be adapted to the wants of animal sustenance by vegetable growths. These elements are all incorporated into the blood, which always remains the same in composition, and its quantity from six to eight per cent. of the bulk of the body. From the blood all the organs are replenished and built up—the nerves, the muscles, the fat, the bones, the skin, the hair, the horns. The amount and quality of the fat, muscle and bone vary greatly in the dairy and the beef type. The fat ox is said to have about three times as much fat as lean flesh, consisting of forty-nine per cent. water, thirty-three per cent. dry fat, thirteen per cent. of dry nitrogenous matter, muscles separated from fat, hide, etc., and three per cent. of mineral matter ; the lean animal fifty-four per cent. water, twenty-five and one half per cent. of dry fat, seventeen per cent. of dry nitrogenous matter, and three and one half per cent. of mineral matters.

The nutritive chemical compounds are divided into two classes, nitrogenous and non-nitrogenous. The term protein includes the first class, which consists of albumen, gluten, casein, legumin, fibrin, mucedin and gliadin, which resemble each other closely in composition, containing very nearly the same proportions of carbon, hydrogen, nitrogen, oxygen and sulphur. With these are classed certain nitrogenous bodies found in grasses and other plants, called amides, which resemble ammonia. Protein, the material of which flesh and blood largely consists, exists ready-formed in the cereals and leguminous and other plants which cattle eat. All these plants contain but a small proportion of protein, their bulk being made up of cellular fibre, sugar, gum starch and oil, called carbo-hydrates. The first class, nitrogenous nutrients, are called proteids, or albuminoids, and sustain animal life. The second class, non-nitrogenous nutrients, consist of carbon and water. Cellulose is the material which, with lignin, forms the framework of plants, an important part of all fodder, the cellulose being

digestible in young and tender plants in proportion of from thirty to seventy per cent., while lignin is not digestible in its crude state. Starch is, next to cellulose, the most abundant carbo-hydrate, and is deposited rapidly near the ripening period; maize contains from sixty to sixty-eight per cent., and wheat from sixty-two to seventy-two per cent. Dextrine is produced from starch by heat. Sugars are of three kinds, cane, grape and fruit sugar. They are all easily digested. Cellulose and starch are supposed to be changed to sugar in the digestive process. Pectin is the jelly of fruits, turnips, beets and carrots, and is believed to aid digestion by gelatinizing the contents of the stomach.

The oils of plants are very important, especially in the rations of dairy cattle. They are estimated to have two and one half times the nutritive value of sugar and starch. Maize contains from four to seven per cent., oats six, the best hay three per cent. of oils. Animals appropriate oil for cream and fat, and also transmute the other carbo-hydrates into fat when needed.

The mineral nutrients are appropriated in the same combination as found in plants.

Table showing the Proportions of Mineral Constituents of some Plants and Grains in One Hundred Pounds of Dry Substance.

HAY.

One Hundred Pounds of Substance.	Ash.	Potash.	Soda.	Magnesia.	Lime.	Phosphoric Acid.	Sulphuric Acid.	Silica.	Chlorine.	Sulphur.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Meadow Hay	6.66	1.71	0.47	0.33	0.77	0.41	0.34	1.97	0.53	0.17
Dead-ripe Hay	6.62	0.50	0.19	0.23	0.85	0.29	0.05	4.18	0.38	0.27
Red Clover	5.65	1.95	0.09	0.69	1.92	0.56	0.17	0.15	0.21	0.21
Swedish Clover	4.65	1.57	0.07	0.71	1.48	0.47	0.19	0.06	0.13	....
Green Vetches	7.34	3.09	0.21	0.50	1.93	0.94	0.27	0.13	0.23	0.15
Green Oats	6.18	2.41	0.20	0.20	0.41	0.51	0.17	2.05	0.25	0.15

GREEN FODDER.

One Hundred Pounds of Substance.	Ash.	Potash.	Soda	Magnesia.	Lime.	Phosphoric Acid.	Sulphuric Acid.	Silica.	Chlorine.	Sulphur.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Meadow Grass in blossom. ...	2.33	0.60	0.16	0.11	0.27	0.15	0.12	0.69	0.19	0.06
Young Grass...............	2.07	1.16	0.04	0.06	0.22	0.22	0.08	0.21	0.04	0.04
Timothy..................	2.10	0.61	0.06	0.08	0.20	0.23	0.08	0.75	0.11	0.08
Oats beginning to blossom.....	1.70	0.71	0.08	0.06	0.12	0.14	0.06	0.47	0.08	0.03
Barley beginning to blossom...	2.23	0.86	0.04	0.07	0.16	0.23	0.07	0.70	0.12	0.05
Rye Fodder................	1.63	0.63	0.01	0.05	0.12	0.24	0.02	0.52	....	....
Hungarian Millet............	2.31	0.86	....	0.19	0.25	0.13	0.08	0.67	0.15	....
Red Clover.................	1.34	0.46	0.02	0.16	0.46	0.13	0.04	0.04	0.05	0.05
White Clover....	1.36	0.24	0.11	0.14	0.44	0.20	0.12	0.06	0.04	0.06
Swedish Clover..............	1.02	0.35	0.02	0.16	0.32	0.10	0.04	0.01	0.03	....
Lucern....................	1.76	0.45	0.02	0.10	0.85	0.15	0.11	0.04	0.03	0.08
Green Peas.................	1.37	0.56	....	0.11	0.39	0.18	0.05	0.04	0.02	....

ROOT CROPS.

One Hundred Pounds of Substance.	Ash.	Potash.	Soda.	Magnesia	Lime.	Phosphoric Acid.	Sulphuric Acid.	Silica.	Chlorine.	Sulphur.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Potato....................	0.94	0.56	0.01	0.04	0.02	0.18	0.06	0.02	0.03	0.02
Beet......................	0.80	0.43	0.12	0.04	0.04	0.08	0.03	0.02	0.05	0.01
Turnip....................	0.75	0.30	0.08	0.03	0.08	0.10	0.11	0.02	0.03	0.04
White Turnip...............	0.61	0.31	0.02	0.01	0.08	0.11	0.04	0.01	0.04	....
Carrot....................	0.88	0.32	0.19	0.05	0.09	0.11	0.06	0.02	0.03	0.01
Cabbage...................	1.24	0.60	0.05	0.04	0.19	0.20	0.11	0.01	0.03	0.05

STRAW.

One Hundred Pounds of Substance.	Ash.	Potash.	Soda.	Magnesia.	Lime.	Phosphoric Acid.	Sulphuric Acid.	Silica.	Chlorine.	Sulphur.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Wheat	4.26	0.49	0.12	0.11	0.26	0.23	0.12	2.82	....	0.16
Rye	4.07	0.76	0.13	0.13	0.31	0.19	0.08	2.37	....	0.09
Barley	4.39	0.92	0.20	0.11	0.33	0.19	0.16	2.36	....	0.13
Oats	4.40	0.97	0.23	0.18	0.36	0.18	0.15	2.12	....	0.17
Maize Fodder	4.72	1.66	0.05	0.26	0.50	0.38	0.25	1.79	....	0.39
Pea Straw	4.92	1.07	0.26	0.38	1.86	0.38	0.28	0.28	0.30	0.07

GRAIN, SEEDS, ETC.

One Hundred Pounds of Substance.	Ash.	Potash.	Soda.	Magnesia.	Lime.	Phosphoric Acid.	Sulphuric Acid.	Silica.	Chlorine.	Sulphur.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Wheat	1.77	0.55	0.06	0.22	0.06	0.82	0.04	0.03	....	0.15
Rye	1.73	0.54	0.03	0.19	0.05	0.82	0.04	0.03	....	0.17
Barley	2.18	0.48	0.06	0.18	0.05	0.72	0.05	0.59	....	0.14
Oats	2.64	0.42	0.10	0.18	0.10	0.55	0.04	1.23	....	0.17
Maize	1.23	0.33	0.02	0.18	0.03	0.55	0.01	0.03	....	0.12
Millet	1.23	0.23	0.07	0.23	....	0.66	0.02	....	....	....
Buckwheat	0.92	0.21	0.06	0.12	0.03	0.44	0.02	....	0.02	....
Flaxseed	3.22	0.04	0.06	0.42	0.27	1.30	0.04	0.04	....	0.17
Peas	2.42	0.98	0.09	0.19	0.12	0.88	0.08	0.02	0.06	0.24
Vetches	2.07	0.63	0.22	0.18	0.06	0.79	0.09	0.04	0.02	....
Beans	2.96	1.20	0.04	0.20	0.15	1.16	0.15	0.04	0.08	0.23
Wheat Bran	5.56	1.33	0.03	0.94	0.26	2.88	....	0.06	....	....
Rye Bran	7.14	1.93	0.09	1.13	0.25	3.42	....	....	....	....
Linseed Cake	5.52	1.29	0.08	0.88	0.47	1.94	0.19	0.36	0.03	....

Table showing average Composition, Nutritive and Money Value of different kinds of Fodder, compiled from Tables of Dr. Wolff for Germany, Dr. Collier for United States, various Analyses of Connecticut Experiment Station, and other American Analyses.

ARTICLES SUITABLE FOR DAIRY CATTLE-FEEDING.

KINDS OF FODDER.			ORGANIC SUBSTANCES.				DIGESTIBLE NUTRIENTS.				
	Water.	Ash.	Proteids.	Fibre.	Other Carbo-hydrates.	Fat.	Proteids.	Carbo-hydrates, including Fibre.	Fat.	Nutritive Ratio.	Value per 100 lbs.
HAY.	%	%	%	%	%	%	%	%	%	As 1 :	$
Meadow Hay, medium.....	14.3	6.2	9.7	26.3	41.4	2.5	5.4	41.0	1.0	8.0	0.64
Meadow Hay, very good...	15.0	7.0	11.7	21.9	41.6	2.8	7.4	41.7	1.3	6.1	0.75
Meadow Hay, extra.......	16.0	7.7	13.5	19.3	40.4	3.0	9.2	42.8	1.5	5.1	0.85
Red Clover, medium......	16.0	5.3	12.3	26.0	38.2	2.2	7.0	38.1	1.2	5.9	0.70
Red Clover, very good.....	16.5	6.0	13.5	24.0	37.1	2.9	8.5	38.2	1.7	5.0	0.79
Red Clover, extra..........	16.5	7.0	15.3	22.2	35.8	3.2	10.7	37.6	2.1	4.0	0.89
Red Clover, aftermath....	16.6	10.5	13.0	25.1	....	....	24.8	41.8	3.7	1.8	....
White Clover, medium....	16.5	6.0	14.5	25.6	33.9	3.5	8.1	35.9	2.0	5.0	0.76
Hay of pure Red Clover....	16.0	5.6	13.4	25.4	36.4	3.2	....	....	....	....	....
Lucern, medium...........	16.0	6.2	14.4	33.0	27.9	2.5	9.4	28.3	1.0	3.3	0.71
Lucern, very good.........	16.5	6.8	16.0	26.6	31.6	2.5	12.3	31.4	1.0	2.8	0.86
Swedish Clover, Alsike....	16.0	6.0	15.0	27.0	32.7	3.3	8.6	34.8	1.8	4.6	0.76
Fodder Vetch, medium....	16.7	8.3	14.2	25.5	32.8	2.5	9.4	32.5	1.5	3.9	0.77
Fodder Vetch, very good...	16.7	9.3	19.8	23.4	28.5	2.3	15.1	31.1	1.4	2.3	0.99
Peas, in bloom...........	16.7	7.0	14.3	25.2	34.2	2.6	9.4	33.1	1.6	4.0	0.77
Lupine, very good........	16.7	4.1	23.2	25.2	28.6	2.2	17.2	36.0	0.7	2.2	1.10
Fodder Rye..............	14.3	5.1	0.4	23.1	44.5	2.8	6.6	44.3	1.3	7.2	0.72
Timothy..................	14.3	4.5	9.7	22.7	45.8	3.0	5.8	43.4	1.4	8.1	0.70
Early Meadow Grass (*Poa annua*), in blossom......	14.3	2.4	10.1	25.9	47.2	2.9	6.0	42.5	2.1	7.9	0.74
Orchard Grass, in blossom.	14.3	4.6	11.6	28.9	40.7	2.7	6.9	40.3	1.9	6.5	0.74
June Grass (*Poa pratensis*), in blossom..............	14.3	5.1	8.9	32.6	39.1	2.3	5.9	40.0	1.6	7.5	0.68
Sheep Fescue............	2.5	3.6	8.8	25.1	57.1	3.6	8.8	57.1	3.6	6.9	0.85
Red-top, in blossom.......	6.4	6.8	10.3	20.6	53.1	2.6	10.3	53.1	2.6	5.4	0.82

AVERAGE COMPOSITION, ETC., OF FEEDING STUFFS (*continued*).

Kinds of Fodder.	Water.	Ash.	Organic Substances.				Digestible Nutrients.			Nutritive Ratio.	Value per 100 lbs.
			Proteids.	Fibre.	Other Carbo-hydrates.	Fat.	Proteids.	Carbo-hydrates, including Fibre.	Fat.		
HAY (*continued*).	%	%	%	%	%	%	%	%	%	As 1 :	$
Meadow Foxtail, after blossom	8.5	7.4	7.8	23.1	49.6	3.2	7.8	49.6	3.2	6.7	0.62
Meadow Soft Grass, very young	9.45	9.0	11.2	16.8	49.3	4.1	11.2	49.3	4.1	4.8	0.85
Fowl Meadow Grass (*Poa serotina*)	14.3	4.4	8.8	21.7	49.0	2.9	7.5	49.0	2.9	6.9	0.69
Blue Grass (*Poa compressa*)	14.3	3.6	6.2	17.8	56.4	2.4	5.3	56.4	2.4	10.9	0.66
Blue Grass, early bloom	5.2	6.2	12.7	19.1	52.7	4.0	10.2	52.7	4.0	4.5	0.83
Foxtail Pigeon Grass, early bloom	5.0	6.9	8.6	24.4	52.4	2.5	8.5	52.4	2.5	6.4	0.70
Johnson Grass	14.3	8.4	10.7	20.2	46.0	1.8	9.16	46.0	1.8	5.2	0.71
Bermuda Grass	14.3	6.9	....	21.4	44.7	....	10.1	44.7	2.4	4.7	....
Quack Grass	14.3	7.8	11.4	16.6	48.2	3.0	9.8	48.2	3.0	5.2	0.76
Gama Grass	14.3	5.3	8.6	22.7	48.2	2.0	7.4	48.2	2.0	6.8	0.65
Timothy	13.5	3.9	6.2	28.9	45.8	1.7	....	....	....	....	....
Timothy and Red-top	14.3	5.5	7.6	26.5	44.1	2.0	....	....	....	....	....
Timothy and June Grass	14.3	4.7	7.0	26.9	45.4	1.7	....	....	....	....	....
Mixed Grasses	14.3	5.1	7.3	26.7	44.9	1.8	....	....	....	....	....
Containing Clover	14.3	5.4	10.9	24.1	43.0	2.3	....	....	....	....	....
Low Meadow Hay	10.0	5.8	7.4	30.8	43.8	2.2	....	....	....	....	....
Salt Marsh Hay	10.7	7.6	6.1	31.9	41.3	2.4	....	....	....	....	....
Japan Clover	14.3	3.8	12.9	20.3	44.8	3.7	12.9	44.8	3.7	3.8	....
Italian Rye Grass	14.3	7.8	11.2	22.9	40.6	3.2	7.1	41.5	1.4	6.3	0.74
English Rye Grass	14.3	6.5	10.2	30.2	36.1	2.7	5.1	35.3	0.8	7.3	0.57
Upland Grasses	14.3	5.8	9.5	28.7	39.1	2.6	5.3	40.9	1.1	8.2	0.64
Mexican Clover	14.3	7.1	....	25.6	45.1	....	5.1	45.2	2.6	9.3	....
Hungarian Grass	13.4	5.7	10.8	29.4	38.5	2.2	6.1	41.0	0.9	7.1	0.66
Desmodium	14.3	6.6	....	21.7	....	2.3	16.2	38.2	7.3	2.5	....
Brown Hay of Clover	14.0	8.2	16.7	25.4	33.3	2.4	....	....	....	....	....

AVERAGE COMPOSITION, ETC., OF FEEDING STUFFS (*continued*).

Kinds of Fodder.	Water.	Ash.	Organic Substances. Proteids.	Fibre.	Other Carbo-hydrates.	Fat.	Digestible Nutrients. Proteids.	Carbo-hydrates, including Fibre.	Fat.	Nutritive Ratio.	Value per 100 lbs.
HAY (*continued*).	%	%	%	%	%	%	%	%	%	As 1 :	$
Brown Hay of Grasses.....	14.3	6.3	8.6	22.4	45.5	2.9	....	....	....	....	....
Brown Hay of Maize......	79.3	1.5	1.0	7.0	10.1	1.1	....	....	....	....	....
GREEN FODDER.											
Grass, before bloom........	75.0	2.1	3.0	6.0	13.1	0.8	2.0	13.0	0.4	7.0	0.22
Pasture Grass............	80.0	2.0	3.5	4.0	9.7	0.8	2.5	9.9	0.4	4.4	0.21
Rich Pasture Grass.	78.2	2.2	4.5	4.0	10.1	1.0	3.4	10.9	0.6	3.6	0.27
Italian Rye Grass.........	73.4	2.8	3.6	7.1	12.1	1.0	2.3	12.6	0.4	5.9	0.23
Timothy Grass...........	70.0	2.2	3.4	8.0	16.3	1.1	2.1	16.0	0.5	8.2	0.28
Upland Grasses..........	70.0	2.1	3.4	10.1	13.4	1.0	1.9	14.2	0.5	8.1	0.23
Maize Fodder............	84.0	1.0	1.4	4.7	8.4	0.5	....	....	....	....	....
Green Maize, German.....	83.0	1.0	1.8	4.4	9.3	0.5	1.0	8.4	0.2	8.9	0.13
Fodder Rye..............	76.0	1.6	3.3	7.9	10.4	0.8	1.9	11.0	0.4	6.3	0.20
Fodder Oats.............	81.0	1.4	2.3	6.5	8.3	0.5	1.3	8.9	0.2	7.2	0.15
Hungarian Grass, in blossom..................	75.0	1.8	3.1	8.5	10.9	0.7	1.8	11.8	0.3	7.0	0.20
Pasture Clover, young.....	83.0	1.5	4.6	2.8	7.2	0.9	3.6	7.4	0.6	2.5	0.25
Red Clover, before bloom..	83.0	1.5	3.3	4.5	7.0	0.7	2.3	7.4	0.5	3.8	0.19
Red Clover, full bloom....	80.4	1.3	3.0	5.8	8.9	0.6	1.7	8.7	0.4	5.7	0.17
White Clover, in blossom..	80.5	2.0	3.5	6.0	7.2	0.8	2.2	7.9	0.5	4.2	0.19
Swedish Clover, beginning of bloom	85.0	1.5	3.3	4.5	5.1	0.6	2.1	5.8	0.4	3.2	0.17
Fodder Vetch, beginning of bloom	82.0	1.8	3.5	5.5	6.6	0.6	2.5	6.7	0.3	3.0	0.18
Fodder Peas, in bloom.....	81.5	1.5	3.2	5.6	7.6	0.6	2.2	7.4	0.3	3.7	0.18
Fodder Cabbage..........	84.7	1.6	2.5	2.4	8.1	0.7	1.8	8.2	0.4	5.2	0.17
White Cabbage...........	89.0	1.2	1.5	2.0	5.9	0.4	1.1	6.0	0.2	5.8	0.11
STRAW.											
Winter Wheat Straw......	14.3	4.6	3.0	40.0	36.9	1.2	0.8	35.6	0.4	45.8	0.37
Winter Barley Straw.	14.3	5.5	3.3	43.0	32.5	1.4	0.8	31.4	0.4	40.5	0.33

AVERAGE COMPOSITION, ETC., OF FEEDING STUFFS (*continued*).

Kinds of Fodder.	Water.	Ash.	Organic Substances. Proteids.	Organic Substances. Fibre.	Organic Substances. Other Carbo-hydrates.	Organic Substances. Fat.	Digestible Nutrients. Proteids.	Digestible Nutrients. Carbo-hydrates, including Fibre.	Digestible Nutrients. Fat.	Nutritive Ratio.	Value per 100 lbs.
STRAW (*continued*).	%	%	%	%	%	%	%	%	%	As 1 :	$
Summer Barley Straw...	14.3	4.1	3.5	40.0	36.7	1.4	1.3	40.6	0.5	32.2	0.44
Barley Straw, with Clover...	14.3	6.7	6.5	38.0	32.5	2.0	3.3	38.8	0.9	12.4	0.53
Oat Straw...	14.3	4.0	4.0	39.5	36.2	2.0	1.4	40.1	0.6	29.9	0.45
Summer Grain Straws, medium...	14.3	4.1	3.8	39.7	36.4	1.7	1.4	40.4	0.7	31.0	0.45
Summer Grain Straws, very good...	14.3	6.7	6.9	36.7	32.9	2.5	2.5	36.9	0.8	15.5	0.47
Fodder Vetch...	16.0	4.5	7.5	42.0	29.0	1.0	3.4	31.9	0.5	9.8	0.46
Pea...	16.0	4.5	6.5	38.0	34.0	1.0	2.9	33.4	0.5	12.0	0.44
Seed Clover...	16.0	5.6	9.4	42.0	25.0	2.0	4.2	28.5	1.0	7.4	0.49
Corn Stalks...	15.0	4.2	3.0	40.0	36.7	1.0	1.1	37.0	0.3	34.4	0.39
Wheat...	14.3	9.2	4.3	36.0	34.6	1.4	1.4	32.8	0.4	24.1	0.37
CHAFF AND HULLS.											
Rye...	14.3	7.5	3.6	43.5	29.9	1.2	1.1	34.9	0.4	32.6	0.37
Oats...	14.3	10.1	4.0	34.0	36.2	1.5	1.6	36.6	0.6	23.8	0.39
Barley...	14.3	13.0	3.0	30.0	38.2	1.5	1.2	35.0	0.6	30.4	0.38
Vetch...	15.0	8.0	8.5	33.0	33.5	2.0	4.2	34.3	1.2	8.9	0.54
Pea...	15.0	6.0	8.1	32.0	36.9	2.0	4.0	36.2	1.2	9.8	0.55
Flax...	11.2	7.2	2.7	45.2	32.6	1.1	0.7	36.8	0.4	53.8	0.38
White Clover...	11.5	7.9	18.3	22.4	36.8	3.1	10.7	34.8	1.5	3.6	0.84
ROOTS AND TUBERS.											
Potatoes...	75.0	0.9	2.1	1.1	20.7	0.2	2.1	21.8	0.2	10.6	0.29
Mangolds...	88.0	0.8	1.1	0.9	9.1	0.1	1.1	10.0	0.1	9.3	0.14
American Mangolds...	92.1	1.04	1.77	0.78	4.23	0.45	...	...	...	...	...
Sugar Beets...	81.5	0.7	1.0	1.3	15.4	0.1	1.0	16.7	0.1	17.0	0.19
Rutabagas...	87.0	1.0	1.3	1.1	9.5	0.1	1.3	10.6	0.1	8.3	0.15
Carrots...	85.0	0.9	1.4	1.7	10.8	0.2	1.4	12.5	0.2	9.3	0.18
Turnips...	92.0	0.7	1.1	0.8	5.3	0.1	1.1	6.1	0.1	5.8	0.16

AVERAGE COMPOSITION, ETC., OF FEEDING STUFFS (*continued*).

Kinds of Fodder.	Water.	Ash.	Organic Substances. Proteids.	Fibre.	Other Carbo-hydrates.	Fat.	Digestible Nutrients. Proteids.	Carbo-hydrates, including Fibre.	Fat.	Nutritive Ratio.	Value per 100 lbs.
ROOTS AND TUBERS (*continued*).	%	%	%	%	%	%	%	%	%	As 1 :	$
Parsnips	88.3	0.7	1.6	1.0	10.2	0.2	1.6	11.2	0.2	7.3	0.18
Sweet Potato	69.7	1.1	1.9	1.7	26.3	0.3	0.9	28.0	0.3	31.9	0.30
American Yam	71.2	0.6	2.1	0.7	25.2	0.2	2.1	25.9	0.2	12.5	0.33
GRAINS AND FRUITS.											
Wheat	14.4	1.7	13.0	3.0	66.4	1.5	11.7	64.3	1.2	5.8	1.13
Rye	14.3	1.8	11.0	3.5	67.4	2.0	9.9	65.4	1.6	7.0	1.08
American Winter Rye	8.7	1.8	12.1	1.4	73.9	2.1	10.8	70.3	1.6	6.8	1.16
Barley	14.3	2.2	10.0	7.1	63.9	2.5	8.0	58.9	1.7	7.9	0.95
Oats	14.3	2.7	12.0	9.3	55.7	6.0	9.0	43.3	4.7	6.1	0.98
Maize	14.4	1.5	10.0	5.5	62.1	6.5	8.4	60.6	4.8	8.6	1.11
Mammoth Sweet Corn	6.47	1.92	12.78	1.88	67.95	9.0	....	....	....	....	....
Sweet Corn, average	8.59	1.88	12.08	2.04	67.37	8.04	....	....	....	....	....
Stowell's Evergreen Sweet Corn	5.98	1.92	11.91	2.66	69.53	8.00	....	....	....	....	....
Millet	14.0	3.0	12.7	9.5	57.5	3.3	9.5	45.0	2.6	5.4	0.93
Golden Millet	13.4	2.8	9.6	11.6	58.6	4.0	7.2	47.0	3.1	7.5	0.87
Rice, hulled	14.0	0.5	7.7	2.2	75.2	0.4	6.9	72.7	0.3	10.7	0.96
Peas	14.3	2.4	22.4	6.4	52.5	2.0	20.2	54.4	1.7	2.9	1.44
Vetch	14.3	2.7	27.5	6.7	45.8	3.0	24.8	48.2	2.5	2.2	1.63
Cow Peas, American	20.0	3.1	21.6	4.7	49.3	1.3	19.4	49.6	1.1	2.7	1.33
Flax Seed	12.3	3.4	20.5	7.2	19.6	37.0	17.2	18.9	35.2	....	2.47
Apples and Pears	83.1	0.4	0.4	4.3	11.8	....	0.3	12.9	....	43.0	0.13
Roxbury Russet	82.2	0.26	0.27	0.95	15.77	0.53	....	....	..	....	....
Pumpkins	89.1	1.0	0.6	2.7	6.5	0.1	0.4	7.1	0.1	18.4	0.08
Squash, American	88.1	0.7	0.9	1.0	9.1	0.2	0.6	9.0	0.2	15.8	0.11
BY-PRODUCTS.											
Coarse Wheat Bran	11.4	5.1	12.9	8.1	59.1	3.5	10.0	48.5	3.1	5.6	1.01
Wheat Middlings	11.8	2.3	11.4	4.8	66.8	2.9	8.9	54.8	2.6	6.9	1.00

AVERAGE COMPOSITION, ETC., OF FEEDING STUFFS (*continued*).

Kinds of Fodder.	Water.	Ash.	Organic Substances. Proteids.	Fibre.	Other Carbo-hydrates.	Fat.	Digestible Nutrients. Proteids.	Carbo-hydrates, including Fibre.	Fat.	Nutritive Ratio.	Value per 100 lbs.
BY-PRODUCTS (*continued*).	%	%	%	%	%	%	%	%	%	As 1 :	$
Rye Bran	12.9	2.9	12.6	2.5	67.0	2.2	10.6	50.0	2.0	5.3	1.00
Buckwheat Bran	14.0	3.4	17.1	14.7	46.4	4.4	13.5	44.0	3.9	4.1	1.15
Pea Meal Bran	12.3	4.2	13.1	31.1	37.8	1.5	9.2	45.8	1.2	5.3	0.86
Pea Meal	11.4	3.5	23.7	4.5	54.5	3.5	20.9	55.4	2.8	3.0	1.53
Millet Bran	9.5	7.5	6.5	57.6	14.4	4.5	4.5	38.8	2.7	10.1	0.66
Barley Bran	12.0	4.1	14.8	19.4	45.6	4.1	11.5	43.2	3.6	4.5	1.04
Wheat Meal	11.5	3.0	13.9	4.8	63.5	3.3	10.8	54.8	2.9	5.7	1.08
Rice Meal	9.9	10.6	10.9	1.1	47.6	9.9	8.6	47.2	8.8	8.0	1.16
Barley Middlings	12.3	6.2	11.6	14.3	52.9	3.6	9.6	47.0	3.2	6.0	0.93
Oat Bran	9.7	3.7	7.1	19.3	57.9	2.3	5.6	49.8	2.0	9.7	0.77
DAIRY PRODUCTS.											
Cow's Milk	87.5	0.7	3.2	....	5.0	3.6	3.2	5.0	3.6	4.4	0.34
Jersey Milk	85.2	0.9	3.6	....	4.9	5.2	3.6	4.9	5.2	....	....
Skimmed Milk	90.0	0.8	3.5	....	5.0	0.7	3.5	5.0	0.7	1.9	0.23
Skimmed Milk, by separator	91.7	0.7	3.1	....	4.1	0.3	3.1	4.1	0.3	....	....
Buttermilk	90.1	0.5	3.0	....	5.4	1.0	3.0	5.4	1.0	2.6	0.22
Whey	92.6	0.7	1.0	....	5.1	0.6	1.0	5.1	0.6	6.6	0.11
Cream	62.0	0.6	2.7	....	2.9	31.8	2.7	2.9	31.8	30.5	1.54
Jersey Cream	36.4	0.2	3.8	....	2.8	56.8	3.8	2.8	56.8	....	....

AVERAGE COMPOSITION, ETC., OF FEEDING STUFFS (*continued*).

Articles of Questionable Utility in Feeding Jersey Cattle.

Kinds of Fodder.	Water.	Ash.	Organic Substances. Proteids.	Organic Substances. Fibre.	Organic Substances. Other Carbo-hydrates.	Organic Substances. Fat.	Digestible Nutrients. Proteids.	Digestible Nutrients. Carbo-hydrates, including Fibre.	Digestible Nutrients. Fat.	Nutritive Ratio.	Value per 100 lbs.
	%	%	%	%	%	%	%	%	%	As 1 :	$
Meadow Hay, poor	14.3	5.0	7.5	33.5	38.2	1.5	3.4	34.9	0.5	10.6	0.48
Fermented Maize Hay	83.5	1.1	1.2	5.3	8.9	0.9	0.8	8.6	0.4	12.0	0.13
Cotton Seed	7.7	7.8	22.8	16.0	15.4	30.3	17.1	18.7	27.3	4.6	2.08
Cotton-seed Meal, decorticated	7.2	5.8	41.5	3.1	24.4	18.0	33.2	17.6	16.2	1.8	2.30
Cotton-seed Meal, undecorticated	11.3	6.4	23.6	22.0	30.5	6.1	17.5	14.9	5.5	1.7	1.14
Palm Seed	7.6	1.8	8.4	6.0	26.8	49.2	8.0	31.2	48.2	18.3	2.75
Palm-nut Cake	10.5	4.2	16.9	17.4	41.0	10.0	16.1	55.4	9.5	4.9	1.61
Palm-nut Cake, American	7.9	4.0	13.5	18.8	41.0	14.8	12.8	56.2	14.0	7.0	1.66
Palm-nut Cake, extracted	10.5	4.0	18.5	20.2	43.5	3.3	17.6	60.4	3.1	3.9	1.44
Linseed Cake	9.1	8.2	32.4	7.3	31.5	11.6	27.6	27.0	10.4	2.0	1.89
Linseed Meal, extracted	9.7	7.3	33.2	8.8	38.7	2.3	27.8	33.9	2.1	1.4	1.61
Sunflower Seed	8.0	3.0	13.0	28.5	23.9	23.6	10.4	24.6	21.2	7.2	1.59
Sunflower Cake	10.3	8.1	37.3	9.9	26.0	8.4	31.3	24.7	7.6	1.3	1.93
Distillery Slump	90.6	0.4	1.8	1.0	5.2	1.0	1.6	5.4	0.8	4.6	0.15
Brewers' Grains	75.2	0.3	5.9	3.9	13.2	1.5	4.8	11.3	1.2	3.0	0.36
Malt Sprouts	11.6	6.7	25.9	9.3	45.5	1.1	20.8	43.7	0.9	2.2	1.33
Rye Refuse, starch factory	70.0	0.8	6.1	2.7	18.9	1.5	5.2	18.1	1.2	4.1	0.44
Wheat Refuse, starch factory	74.0	0.6	4.4	3.4	15.4	2.2	3.7	15.1	1.8	5.3	0.37
Potato Refuse, starch factory	86.0	0.4	0.8	2.0	11.7	0.1	0.8	13.7	0.1	17.4	0.16

AVERAGE COMPOSITION, ETC., OF FEEDING STUFFS (*continued*).

Articles of Questionable Utility in Feeding Jersey Cattle (continued).

Kinds of Fodder.	Water.	Ash.	Organic Substances. Proteids.	Fibre.	Other Carbo-hydrates.	Fat.	Digestible Nutrients. Proteids.	Carbo-hydrates, including Fibre.	Fat.	Nutritive Ratio.	Value per 100 lbs.
	%	%	%	%	%	%	%	%	%	As 1 :	$
Rape Cake............	11.3	7.1	31.6	11.0	29.9	9.6	25.3	23.8	7.7	1.7	1.66
Rape Meal, extracted...	8.5	7.9	33.1	13.4	34.1	3.0	26.5	27.2	2.4	1.3	1.51
Apple Pomace........	77.2	0.5	0.9	3.9	15.7	1.7	...	....	....	....	....
Ensilage of Maize......	82.0	....	...	....	....	....	1.0	10.1	0.5	11.4	0.16
Ensilage of Rye.......	76.2	....	....	....	....	....	1.9	12.0	0.4	6.8	0.21
Ensilage of Red Clover.	79.2	....	....	....	....	....	3.0	8.1	1.7	4.0	0.28
Ensilage of Sorghum...	77.3	....	....	....	....	....	1.6	11.9	0.3	7.4	0.19
Rye Straw, ripe.......	14.3	4.1	3.0	44.0	33.3	1.3	0.8	36.5	0.4	46.9	0.35
Timothy Ensilage......	70.0	....	....	....	....	....	2.1	16.0	0.5	8.2	0.28
Cow Peas Ensilage.....	76.0	....	....	....	....	....	3.0	9.4	0.2	3.2	0.24
Orchard Grass Ensilage...............	74.0	....	....	....	....	....	2.6	12.4	0.4	5.1	0.24
Maize Ensilage, poor...	74.2	0.8	0.9	4.7	7.0	0.3	....	....	....	....	....
Carrot Leaves Ensilage...............	82.2	....	....	....	....	....	2.2	7.0	0.5	3.8	0.18
Extra Maize Ensilage...	84.9	1.8	1.9	7.9	13.0	0.9	....	....	....	....	....
Best Maize Ensilage*...	77.6	1.7	2.0	6.0	12.0	0.54	....	....	....	....	....

* This was a sample analyzed at the Connecticut Station, made from corn well advanced in ear. It contained acetic acid $\frac{103}{1000}$, "equivalent to one quart of strong vinegar per hundred pounds," and $\frac{396}{1000}$ alcohol, equivalent to one pint of rum per hundred pounds of ensilage.

VALUE OF THE TABLES.

These valuations are only approximate. The standard is average meadow hay figured at sixty-four cents for one hundred pounds. The German estimates by Dr. Wolff on the basis of four and one third cents for one pound of digestible proteids, four and one third cents for one pound of digestible fat, and nine tenths of a cent a pound for the digestible carbo-hydrates.

The feeder will learn to make practical use of the tables by frequent reference to them, and comparing the estimates with the results of his own practice. By the exercise of his own skill he can combine such elements as are best to form rations for his own stock.

REQUISITES TO SUSTAIN LIFE AND HEALTH.

The animal heat must be sustained by the carbo-hydrates and the carbon of the *proteids*. This is believed to be accomplished by oxidation in the cells and capillary vessels of the body, and consumes the starch, gum, sugar and cellulose, and furnishes the carbon given off in breathing.

The fat which is stored up in the body, as well as the great quantity secreted in milk, must be supplied by vegetable oils. The natural wear and waste of muscle and cartilage and the growth of these in young animals must be sufficiently provided for in proteids, as albumen, gluten, casein, legumen, fibrin, mucedin and gliadin. The bones and teeth must be built up and nourished by earthy phosphates, and the processes of digestion, assimilation and excretion aided by saline substances, chlorides, sulphates, and other elements that appear in the various excretions after fulfilling their purpose. Food that furnishes all these essential elements in right proportions and sufficient quantity in the most palatable and digestible forms must be provided by the care and skill which meets all the purposes of the dairyman and the breeder of butter cattle. These objects cannot be accomplished without a great variety of grasses, grains, leguminous plants and roots.

AMERICAN FEEDING STUFFS.

Average Selections from Table of American Analyses.

COMPILED BY E. H. JENKINS, PH.D., CONN.

Agricultural Experiment Station Report, 1884.

Name.	Number of Analyses.	Total Dry Matter.	Protein.	Fat.	Nitrogen, Free Extract.	Fibre.	Ash.
GREEN FODDERS.							
Maize	22	18.86	1.30	.32	10.65	5.37	1.22
Maize Ensilage	31	19.29	1.47	.72	9.88	5.88	1.34
Cow Pea Vine and Pods	2	15.94	3.12	.60	6.91	3.48	1.83
Rye	5	25.30	2.60	.65	5.90	14.30	1.90
HAY.							
Clover Hay	12	84.98	11.38	1.98	40.11	26.35	5.15
Timothy	18	87.42	6.36	2.03	44.89	29.93	4.23
Sorghum Leaves	3	27.00	3.10	.....	*15.10	5.20	3.50
Hungarian Grass	8	83.30	6.59	1.81	42.49	27.16	5.24
Oat Straw	3	89.89	3.35	2.07	36.97	42.78	4.72
Maize, Field-cured	6	67.95	4.29	1.24	35.96	22.14	4.32
Cow Pea Vines	6	88.95	15.68	2.87	42.17	19.82	8.41
ROOTS.							
Beets (red)	2	11.43	1.60	0.18	7.40	1.16	1.08
Carrots	2	12.68	1.38	0.67	7.28	1.93	1.34
Mangolds	3	7.96	1.70	0.20	4.19	0.82	1.05
Potatoes	2	21.35	1.23	0.13	18.72	0.38	0.89
Sweet Potatoes	3	29.72	0.97	0.31	26.13	1.36	0.93
Turnips	1	11.11	1.34	0.09	8.11	0.86	0.71
Rutabagas	1	12.92	1.15	0.09	9.11	1.16	1.41
FRUITS.							
Apples	1	15.89	0.21	0.28	14.26	0.91	0.23
Squash	2	5.12	0.66	0.28	3.24	0.54	0.40

* Includes fat.

OXFORD KATE 13,646.

AT 5 YEARS OLD.

Khedive Type.

R. S. ANDREWS, BALTIMORE, MARYLAND.

MISS SHARPLESS 24,352.

Khedive Type.

HIGHLAND HERD.

JAMES N. SMITH, LITCHFIELD, CONNECTICUT.

AMERICAN FEEDING STUFFS (*continued*).

Average of American Analyses (continued).

NAME.	Number of Analyses.	Total Dry Matter.	Protein.	Fat.	Nitrogen, Free Extract.	Fibre.	Ash.
GRAINS.							
Peas	1	21.94	4.37	0.55	14.48	1.66	0.88
Barley	9	88.90	12.40	1.80	69.30	2.90	2.50
Cow Pea	5	85.21	20.77	1.43	55.75	4.06	3.20
Soja Bean	3	91.41	36.22	17.92	28.66	4.24	4.37
Maize Kernel (Dent)	77	89.93	10.36	5.15	70.60	2.29	1.53
Maize Kernel (Flint)	63	88.93	10.67	5.00	70.08	1.71	1.47
Maize Kernel (Sweet)	24	91.42	11.71	8.31	66.54	2.82	1.93
Maize Kernel (Western)	3	80.90	8.30	3.70	66.00	1.75	1.20
OATS	21	89.30	11.30	5.00	61.00	9.00	3.00
Rice	10	87.60	7.40	0.40	79.20	0.20	0.40
Rye	6	88.40	10.60	1.70	72.60	1.60	1.90
Wheat (Winter)	229	89.63	11.82	2.14	72.04	1.77	1.86
Wheat (Spring)	13	89.63	12.51	2.20	71.19	1.82	1.91
Sorghum Seed	9	87.48	8.88	3.65	71.27	1.88	1.80
MEAL AND BRAN.							
BARLEY MEAL	3	84.90	11.80	1.70	70.90	0.10	0.50
Hominy	2	86.51	8.25	.44	77.12	0.32	0.38
MAIZE MEAL	20	85.14	9.26	3.82	68.58	2.29	1.54
OAT MEAL	6	92.15	14.66	7.06	67.57	0.86	2.00
Cotton-seed Meal	22	92.17	42.45	13.36	23.49	5.67	7.20
Linseed Meal, old process	4	91.28	31.23	8.72	37.75	7.34	6.24
Linseed Meal, new process	6	89.49	33.45	2.83	38.78	8.37	6.06
RYE BRAN	3	87.70	15.26	2.19	63.12	3.51	3.62
Wheat Middlings	9	88.03	12.27	3.23	65.48	4.58	2.47
WHEAT BRAN	2	87.98	14.54	3.66	55.16	8.79	5.83
Wheat Shorts	6	88.15	13.14	3.79	51.22	6.12	4.85

RELATIVE VALUE OF FEEDING STUFFS.

100 lbs. Good Hay	lbs.
Beets	670
Turnips	470
Clover, Green	375
Carrots	371
Mangolds	368
Lucern Hay	89
Clover Hay	88
Corn	62
Oats	59
Barley	58
Rye	53
Wheat	44
Linseed Oil-cake	43

SUMMARY OF FOOD ELEMENTS.*

"1. The earthy substances contained in food, consisting chiefly of lime and magnesia, present the animal with the materials of which the long skeleton of its body principally consists.

"They may be called, therefore, bone materials.

"2. The saline substances—chloride of sodium (common salt) and potassium, sulphate and phosphate of potash and soda and some other mineral matters occurring in food—supply the blood, juice of flesh, and various animal juices, with the necessary mineral constituents.

"3. Albumen, gluten, legumen and nitrogen, containing principles of food, furnish the animal with the materials required for the formation of blood and flesh. They are therefore called flesh-forming substances.

"4. Fat and oily matters of the food are employed to lay on fat, or to support respiration and animal heat.

"5. Starch, sugar, gum, and a few other non-nitrogenized substances, consisting of carbon, hydrogen and oxygen, are used to support respiration (hence they are called elements of respiration), as they produce fat when given in excess.

"6. Starch, sugar, and other elements of respiration alone cannot sustain the animal body.

"7. Albumen, gluten, or any other albuminous matter alone does not support the life of herbivorous animals.

"8. Animals fed upon food deficient in earthy phosphates or bone-producing principles grow sickly and remain weak in the bone.

* Chemistry of Food, Dr. August Voelcker.

"9. The healthy state of an animal can only be preserved by a mixed food, which contains flesh-forming constituents as well as heat-giving principles, and earthy and saline mineral substances in proportion, determined by experience, and adapted to the different kinds of animals, or to the purposes for which they are kept."

DIGESTION IN CATTLE.

The digestive organs of cattle are very complex. Digestion begins in the mouth and is completed in the large intestine. The mouth is the mill for grinding and salivating food. It contains the tongue, teeth, salivary glands, and also the organs of taste, which latter, aided by the sense of smell, inform the animal in selecting what is good and rejecting what is unsuited to its use. There are five sets of salivary glands—the *parotid* glands, the largest, one on each cheek in front of the ear; the *submaxillary*, under the lower jaw; the *sublingual*, under the tongue; the *molar* glands, parallel to the molar arches; the *lip and palate* glands. These all discharge a thin fluid into the mouth. This fluid, or saliva, contains an element called *ptyalin*, which changes starch to sugar. A large cow is believed to discharge more than a gallon of saliva while chewing the cud one hour. If the cow is in good health and a large milker she must feed largely and secrete an enormous quantity of saliva, and that food is best which is given in a form requiring remastication. Ground feed should be mixed with cut hay to make the whole mass bulky, so as to be raised for cud-chewing.

Bovine animals have a compound stomach with four compartments: the first, or *rumen*, holds about eight bushels in a full-sized ox, and makes up about nine tenths of the bulk of the quadruple stomach. It fills the left side of the belly from the short ribs to the hips, and is lobulate in form, having three compartments.

The second stomach, *reticulum*, is a prolongation forward of the left sac of the rumen, the communicating connection allowing the soft contents to pass freely from the rumen. Its lining membrane has cells like a honeycomb.

These organs are connected with the gullet, and also the third stomach, by a curious structure called the *demi-canal*. This structure forms a common way for the first three stomachs, and has also the power of contracting its walls so as to communicate only with the third stomach.

The third stomach, *omasum*, or manifold, is larger than the second, lies over the reticulum to the right, and above the right fore-sac of the rumen, beneath the short ribs on the right side.

On its convex side a dozen or more leaf-like folds extend nearly across the organ. These are interspersed with shorter folds in alternation, the smallest becoming mere ridges. These present a large amount of apposite surface, and the partitions being endowed with involuntary muscles, for the moving of adjacent surfaces against each other, the third stomach is thus made a triturating apparatus.

The fourth stomach, *rennet*, is of an elongated oval form, tapering backward in the right flank at the lower border of the rumen, to its termination, where it joins the small intestine. Although second in size, it is very small compared with the rumen. This organ corresponds to the one stomach in other animals. This is the organ for secreting and mixing the gastric juice with the softened aliment.

The coarser foods pass as soon as taken into the rumen or to the (reticulum) reticule; finer and softer foods may pass at once to the third and the fourth stomachs.

Liquids with finely divided food may be distributed through the four stomachs, liquids being propelled through the demi-canal into the manifold and rennet by a series of contractions of the reticulum while the animal is drinking. Thus some foods may reach the manifold and rennet and not be returned for rumination. The rumen often holds two hundred pounds of food when an ox is slaughtered. This is one fourth food mixed with three times its weight of saliva and some water. The reticule usually contains liquid. The strong involuntary muscles of these organs give a continuous churning movement to all their contents, rendering all soluble elements into a condition for mixing with the gastric juice of the rennet.

The great bulk of the food in the rumen and a small portion from the reticule are floated back in small quantities to the mouth for mastication. This is done by a muscular compression of the rumen, a contraction of the demi-canal and gullet from below upward, thus forcing a mouthful of liquid mixed with fibrous matter to the tongue and palate, which seize the solid portion in a mass, separating and swallowing the liquid. The solid is then leisurely chewed and remixed with saliva, when it is passed on to the several receptacles, according to its degree of preparation, some of it probably being masticated and remasticated many times before it is fit for the rennet.

The good cow is content to spend a large portion of her time chewing the cud. She has a very capacious rumen, needs from twelve to fifteen gallons of water daily, and perfect quietude. Any worriment or disturbance of the general health interferes with the process of rumination. The manifold presses out the fluid portions of the food, and triturates the residue, still further pulverizing it. In the rennet it is mixed with the gastric juice, which transforms the protein elements into milky peptones, ready for absorption by the lymphatic vessels of the rennet, and the carbo-hydrates already converted into sugar by the saliva are also absorbed by the gastric blood-vessels, while a large portion of the food needs something more than the compound acid and pepsin of the stomach, and must be passed onward to the intestinal canal to complete the process of digestion. At the proper time the pylorus, a sphincter or circular gate, involuntarily opens, allowing the contents of the rennet to flow into the next vessel, a long, thin tube, convoluted and doubled upon itself in many folds and festoons. The first part is the *duodenum*. This organ has its involuntary muscular structure

for propulsion, and a mucus lining filled with little follicles which secrete a digestive fluid. Here also through two orifices is received the bile from the liver, and the pancreatic juice from the pancreas, to digest and emulsify the fats and prepare them for the subsequent production of butter. Here also any undissolved starch is, by the combined action of the bile and the *diastase* of the pancreas, rendered into sugar, and any protein elements needing further preparation are served with the proper solvents, and the nutritive fluids are absorbed and pass into the general circulation. The small intestine is about one hundred and twenty feet in length, and leads into the large intestine, which has a length of about thirty feet. Here what is left of assimilative elements in the digested food is absorbed, and the excretory refuse is thrown out upon the surface of the lower or small *colon*, and becomes fecal matter, which is formed into round masses by the propulsive contractions of the tube, and progressively expelled from the rectum.

The following interesting table is taken from Roberts, and gives a general view of the process of digestion:

TABLE OF THE DIGESTIVE JUICES AND THEIR FERMENTS.

Digestive Juices.	Ferments Contained in Them.	Action on Foods.
Saliva	Salivary Diastase or Ptyalin	Changes starch into sugar and dextrin.
Gastric Juice	*a.* Pepsin	Changes proteids into peptones in acid medium.
	b. Curdling Ferment	Curdles casein of milk.
Pancreatic Juice	*a.* Trypsin	Changes proteids into peptones in alkaline and neutral media.
	b. Curdling Ferment	Curdles casein of milk.
	c. Pancreatic Diastase	Changes starch into sugar and dextrin.
	d. Emulsive Ferment	Emulsifies and partially saponifies fats.
Bile		Assists in emulsifying fats.
Intestinal Juice	*a.* Invertin	Changes cane-sugar into invert-sugar.
	b. Curdling Ferment	Curdles casein of milk.

Starch is attacked along the whole line of the alimentary track. Albuminous elements in the rennet and small intestines. The ferments which curdle milk are found in the rennet and pancreas, and possibly in the small intestine. The bile is alkalescent in its reaction, and helps absorption of fatty matters by its emulsifying properties. Healthy bovine digestion depends largely upon appropriate food to suit the complicated series of ferment-actions here illustrated.

The kidneys, the skin and the lungs all assist in excreting the waste materials that have served their purpose. The nitrogen of the food, with the exception of what is appropriated in building up the body or the formation of milk, is believed to be all recovered in the dung and urine. When animals are fed upon rich food the urine will sometimes yield forty per cent. of phosphoric acid, but upon coarse fodder little or none will be found in the urine, while ninety-five per cent. of the soda and potash of the food are excreted in the urine, and also about thirty per cent. of the magnesia, most of the sulphuric acid and chlorine; the silica, with the rest of the ash constituents not utilized in the production of milk or structure of tissues, is excreted in the dung. These facts show the importance of an intelligent selection of all fodders, and also the value and importance of saving all manure, especially the liquid portions.

SOILING CATTLE.

"Turning pasture into tillage makes the man."—*English Proverb.*

The cutting of green forage plants and feeding to cattle in the stable is commonly termed "soiling," a practice which must become general on all land that is suitable.

THE SEVEN POINTS OF SOILING.

1. It saves land.
2. It saves food.
3. It saves fences.
4. It saves manure.
5. It saves health and condition.
6. It saves the losses of ordinary unproductiveness.
7. It saves the profits of well-employed labor.

THE SAVING OF LAND.

The contrast between feeding luxuriant cultivated crops and ordinary pasturing is as wide as the distinction between civilization and barbarism. Indeed, the one is the result of civilization and progress, while the other is essentially barbaric in its methods.

Soiling utilizes the land for all it can produce of the best crops. Pasturing usually takes what chances to grow, whether good or bad; and, as the animal occupies

its own dish and tramples its own food ; scatters its dung and urine upon it ; lies upon it and breathes upon it, to the disgust of other animals—it naturally results that a wide space of ground is rendered unprofitable. Besides, the soil that is thus rendered useless ought to be producing crops which in a cold climate must be relied upon for winter support from six to eight months of the year.

It is estimated that under skilful management of pasturing it requires three acres to furnish an equivalent for one acre of forage crops. Under poor pasturing there is a much wider variation, so that fifty acres under the forage system are equal to one hundred and twenty-five acres under the barbaric system of pasturage.

THE SAVING OF FOOD.

The saving of food is the result of having the food under complete control as to growth, selection of kind and quantity, which is or ought to be such that it is wholly eaten, and all the waste caused by the animal from trampling, fouling, lying upon, breathing upon and overgrazing are precluded. Cattle will also eat many weeds, such as daisies and thistles, when cut, in a tender and succulent condition or mixed with other food. The forage system saves everything that is aromatic and edible, and this leads to the extermination of weeds by cutting them before bloom.

The cattle cannot be fed with profit from food used in pasturing, because they are obliged to expend its value in many hours of unprofitable foraging for themselves in the vain effort to utilize dry grass and the branches of trees, so that, whereas the cow should speedily fill the rumen and chew her cud, she must spend sixteen hours to get the amount of a square meal, and then fail in filling her udder.

THE SAVING OF FENCES.

Many a man spends more for fences to keep cattle within the bounds of a poor pasture than the land itself is worth. But on good land the expense is a profitless outlay, as it costs a tax of one dollar per acre as the annual expense of maintaining pasture fences. Where the land admits of it, it were far better to employ one hundred dollars' annual outlay for the fences of a hundred-acre farm in maintaining three times the number of cattle and steadily improving the richness of the farm.

THE SAVING OF MANURE.

The estimates of the value of manure by various authorities warrant the placing it at twenty dollars per cow or upward, provided all the excrement is saved.

The soiling system is the only means of saving this amount, and under this system the manure that is daily dropped in the exercise lot should be gathered in a cart and dumped upon the heap in the manure house. It is wasted if allowed to remain where it is, and would be more than half wasted in the pasture by evaporation or washing into brooks and sloughs.

Those who have had many years' experience in soiling declare that the saving of the manure is more than a full compensation for all the labor in soiling.

THE SAVING OF HEALTH AND CONDITION.

The exercise of the animal, like its food, is all under the control of the owner, and may be so managed as to render the animal healthful and profitable, while the pasturing system may compel the animal to take too much exercise, and that often of a very unprofitable kind.

The health of the animal is benefited by a proper selection of food of abundant quantity. The pasture gives an unequal and often scanty supply of food of an indifferent or bad quality, at a waste of energy in searching for it.

The animal is protected, in the cool stable, from the scorching heat, from the tormenting flies and mosquitoes, and from chilling storms and wet. Surely this protection, combined with good feeding and careful exercise in a convenient yard, cannot but be conducive to the fullest health and comfort.

SAVING BY INCREASED PRODUCTIVENESS.

The dairy cow needs but a very moderate amount of exercise, and both exercise and food must be so controlled as to develop the highest capacity for the production of milk, butter and cheese.

The forage system is adapted to produce such results because it enables the animal to be fed a full ration at all times, so that all her powers are devoted to the one objective point of transforming the greatest possible amount of wholesome fodder into the greatest possible amount of wholesome human food, and this is accomplished by soiling; for actual tests have demonstrated that the productiveness of herds has been more than doubled year by year for long periods. An experiment by Dr. Rhode, of the Eldena Royal Academy of Agriculture of Prussia, conducted through seven years of pasturing and seven years of soiling, gave an average for each cow at pasture for seven years of one thousand five hundred and eighty-three quarts annually, while for soiling the average for each cow was three thousand four hundred and forty-two quarts, giving much more than double productiveness.

And now the saving of land, of food, of fences, of manure, of health, of productiveness, all conduce to the

SAVING OF PROFIT UPON LABOR EMPLOYED.

There is a profit from labor employed because it is expended judiciously in bringing immediate returns and also permanently enriching the farm. Professor Stewart in his excellent work, "Feeding Animals," shows how one man can with proper tools and appliances perform all the hand labor for soiling one hundred head of cattle. The annual expense for fences for pasturing one hundred head

of cattle would be not less than three hundred dollars, at a loss of one half their productiveness. The feeder needs a team, mowing-machine, horse-rake, wagon and hay-loader, and a good growth of soiling crops.

SOILING CROPS.

Large crops of the following list of plants are to be recommended for cultivation, to be fed in the order produced, but taking care to combine several of them, when practicable, in one ration.

1. Winter Rye (*Secale cereale*).
2. Winter Barley (*Hordeum*).
3. Red Clover (*Trifolium pratense*).
4. Orchard Grass (*Dactylis glomerata*).
5. Italian Rye Grass (*Lolium Italicum*).
6. Timothy (*Phleum pratense*).
7. Timothy and Large Clover.
8. Timothy and Alsike (*Trifolium hybridum*).
9. Green Oats (*Avena sativa*).
10. Winter Wheat (*Triticum vulgare*).
11. Cow Peas and Oats.
12. Common Millet (*Panicum milliacium*).
13. Hungarian Grass (*Setaria Germanica*).
14. Italian Millet (*Setaria Italica*).
15. Vetch (*Vicia sativa*).
16. Spring Wheat (*Triticum vulgare var.*).
17. Sweet Corn (*Zea mays var.*).
18. Dent Corn (*Zea mays var.*).
19. Flint Corn (*Zea mays var.*).
20. Spring Barley (*Hordeum vulgare var.*).
21. Spring Barley and Rye.
22. Savoy Cabbage (Improved American).
23. Schweinfurt Quintal Cabbage.
24. Sugar Beets.
25. Mangolds.
26. Butman Squash.
27. Pumpkin.
28. Carrots.
29. Rutabagas.
30. Parsnips.

For the Southern and some of the Western States may be added:

31. Lucern.

32. Gama Grass.

33. Alfilaria (*Erodium cicutarium*), an aromatic geranium grown as a forage plant in California.

34. Tall Oat Grass.

35. Texas Millet.

36. JOHNSON GRASS (*Sorghum halapense*), a very important perennial; use one bushel clean seed per acre.

37. MILLO MAIZE.

38. Cow PEAS.

39. Satin Grass.

40. Sweet Potato.

41. Yam.

And many other plants.

SOUTHERN SOILING.*

"With green oats for feed in March, April and May; corn in May, June and July; German millet and cow peas in July, August and September, aided by millo maize in times of long dry spells, like the recent one for September, down to and into December, surely one great problem in the possibility of the South becoming a dairying and fine stock section is solved.

"Millo maize is a new plant introduced only two years ago in our vicinity (Mobile), the seed coming from South Carolina, and introduced into this country from Brazil. It evidently belongs to the Sorghum family, closely resembling amber cane. For two years I have watched it on the farms of two of my neighbors, and particularly this year—a year of a most prolonged and disastrous drouth—where the ordinary growth of our pastures, scanty enough at the best, was dry enough to burn.

"At the home farm of State Senator Smith a field was planted in July. From this field *two* immense crops of rich, juicy food have been taken, and now (November 14th) the *third* crop stands ready for gathering, while from the stubble of some recently cut a luxuriant growth is springing, and this in spite of the fact that within the past fortnight we have had heavy white frosts. Beginning in July, the rainfall till the last of October amounted to almost nothing, yet through all this long drouth this wonderful plant was rank, green, and as dense as a canebrake. It seemed to utterly ignore the dry, hot days that parched and burnt every other living thing, and stood a living oasis in a desert of arid fields.

"It seems essentially a sun plant—those who introduced it here claim this for it —and no better test could have been given than what it underwent this year

* George G. Duffee, in "Country Gentleman," December, 1884.

Planted in rich and well-prepared land, in rows eight feet apart, after the ground is thoroughly warm, it grows rapidly to a height of ten feet, and can be cut from two to four times in the season. Mr. Smith's foreman tells me that the mules and cattle eat it with avidity."

Good reports are given by various writers of the excellent results of cultivating Johnson grass (*Sorghum halapense*) in the Southern States. It is a perennial, producing under irrigation four or five enormous crops annually of green fodder. It is regarded as drouth-proof, and well adapted to hot and arid regions.

For green manuring the cow pea is one of the best crops for the Southern States.

General Soiling Crops.

WINTER RYE (*Secale cereale*).

This is a hardy, succulent plant, growing from four to six feet high, and flourishing best on sandy or gravelly loam that is moderately rich. If the crop is put in by the first of September in the North, and by the first of November in the Southern States, it will be well rooted before cold weather, and may be fed off or cut with a machine, leaving it from two to three inches high. Rye is ready to cut very early in spring, when it should be mixed with clover hay for feeding. Oatmeal and wheat bran are good accompaniments, as protein is needed to make a good ration. Rye should be sown with a drill at the rate of one bushel to the acre. In the early spring it is greatly benefited by cultivating the ground with a smoothing-harrow. If cut frequently and kept from heading it becomes a perennial, but it is most profitable as a single crop, cut when in blossom and the ground planted again to a late crop. Rye is ready to cut from about May 1st to 15th in latitude 38° to 40°. One square rod is sufficient for one day for each animal, but it is better to mix other food, as the rye alone is not a perfect food. Turn under heavy crops of rye early in spring as green manure.

WINTER BARLEY.

Winter barley is suited to clay or clay loam. Barley grows best in the cool weather of spring and fall, and helps to give variety to the fodder. It is one of the best of forage plants, also a good grain for butter cows.

RED CLOVER.

This plant is ready for cutting in latitude 38° to 40° from about May 10th to June 1st, and is very succulent. It furnishes green about twenty thousand pounds to the acre, which would feed twenty cows from ten to twelve days. The second and third cuttings will furnish from twelve thousand to fifteen thousand pounds more, sometimes yielding as high as twenty tons in a season. It is one of the most important soiling crops. Its long roots draw fertility from the subsoil and its leaves from the air. Use ten pounds of seed per acre. Also one of the best crops for green manure.

ORCHARD GRASS.

This grass is ready for cutting with clover. It is of great merit, and may be cut three times a season on rich soil. It should be sown thickly, *three bushels of seed to the acre.* It is good alone or mixed with clover, and is well worthy of universal favor as a forage plant.

TIMOTHY.

Timothy will cut as high as ten tons of green fodder before blossoming, and is a very nutritious forage plant. It should be cut when in full bloom or when the bulb is ripe enough to survive.

TIMOTHY AND LARGE RED CLOVER.

The large pea-vine clover makes a good combination with timothy and adds more protein to the ration. This may be cut twice a year; the first cutting may reach as high as sixteen tons to the acre, and will feed thirty cows ten days; the second cutting will feed thirty cows three days.

TIMOTHY AND ALSIKE.

The Swedish hybrid clover is very hardy, and will yield good crops for ten years. It branches much, and the roots penetrate deeply into the soil. It lasts long in bloom, and may be cut for a month. This combination will feed thirty cows per acre twelve days.

Alsike should be thinly seeded, and may be sown with timothy either in the spring or fall. Ten pounds of timothy seed per acre and six of alsike.

GREEN OATS.

Oats require a cool climate and rich, deeply tilled soil for their perfection. They are ready for forage from last of June to middle of July. If cut before heading in June they make a quick second growth. For a soiling crop it must be put in with a drill as early as the ground will admit, with two bushels of seed to the acre. For culture use one or two harrowings with the smoothing-harrow, until they are two or three inches high. Make the first cutting when about a foot high. They are most profitable, however, when cut in the milk, using but one crop.

A better method of cultivation for seed crop, if some of the large varieties of oats are used, is to plant in drills sixteen inches apart, dropping single seeds one foot apart in the drill and tilling with cultivator. Mr. Burpee reports crops of the "Welcome Oat" raised by Mr. Alfred Rose, of Penn Yan, New York, where one ounce of seed produced three thousand seven hundred and eighty-eight ounces of very heavy oats, and two ounces of seed produced ten bushels and three pecks of oats, weighing four hundred and seventy-three and a half pounds.

Roswell Parkhurst, in Montana, raised three hundred and thirty-two pounds, and August Mongin, of Illinois, three hundred and fifteen pounds from two ounces of seed, while six other competitors raised from two hundred to two hundred and seventy-six pounds from two ounces of oats. Specimens were grown six feet four inches high, and as many as seventy-six stalks from one seed. Most of them report hoeing twice and keeping free from weeds. This is doubtless the best way to cultivate wheat, rye and oats where the grain is to be ripened, and it might be well to try the experiment for forage crops. Oat seed needs to be large and heavy to produce good plants. The oat is sure to degenerate in a dry and hot climate, but good seed will produce a good crop the first year. The oat makes most excellent hay if cut green or when in the milk.

PEAS AND OATS.

The pea when combined with the oat makes an excellent milk ration. They grow well together. Plant with drill four bushels per acre of a mixture of forty quarts of oats with two bushels of peas. Cut when the oat is in the milk. If the peas are allowed to get too ripe the butter will not be of so good a flavor. Plant as soon as the ground will admit in spring. Steep seed one night in diluted urine, drain, and roll in mixture of ashes and plaster. This combination has produced as high as fourteen tons to the acre. Peas need lime and bone-powder to insure good crops.

WINTER WHEAT.

Plant in September same as recommended for rye and oats; requires but three pecks of seed per acre if cultivated like maize.

MILLET.

Millet requires a very mellow, rich soil. Clay loam, if thoroughly underdrained and well tilled, will produce the largest crops. Millet grows five feet high, and produces as much as eighteen tons of green fodder, and is a little richer in nutritive value than timothy. Plant with drill sixteen quarts or broadcast twenty-four quarts of seed to the acre, one fourth inch deep, from first of May to July. Cut just before blossoming.

HUNGARIAN GRASS.

This is a millet which grows three feet high and has an abundant foliage and a large quantity of fine seed. It is the most nutritious of green forage grasses. Objection is made to the stiff bristles which surround the seed spikelets, which are said to have caused the death of cattle by penetrating the stomach. Early cutting would avoid this objection. Sow in early June twenty-four quarts of seed per acre for forage or green hay. Cut in early bloom. The richest, by analysis, of green manure crops.

ITALIAN MILLET.

This grows four feet high, has abundant foliage, and yields the greatest quantity of seed; has been reported to produce five times as much grain as wheat. Pure Italian should be yellow when ripe.

VETCH.

The winter vetch may be sown with rye or the spring vetch with oats. Its food value is similar to the pea. It may be cultivated alone, and bears several cuttings of heavy growth. Spring wheat may be cultivated in drills, same as recommended for oats.

SWEET CORN.

This is the best of all forage plants, and pays several per cent. profit with less labor than any other crop.

Good varieties are known as Early Minnesota, Potter's Excelsior, Stowell's Evergreen, Mammoth Late and Egyptian, which form a succession in the order mentioned. Sweet corn is more nutritious than the dent or flint varieties of maize. Plant in drills thirty-two inches apart and one plant every six inches in the rows, so that ears may be formed. It should be combined with clover, oats and peas, in feeding, or wheat bran and middlings can be fed with corn. Cut the corn when the ears are in the milk. The corn should always be run through a feed cutter, reducing it to lengths of from two to four inches.

DENT CORN.

The large varieties of dent produce heavier crops than sweet corn, but the quality is not as good.

There is no plant that produces such a weight of green food, unless it be sorghum cane. Crops have been reported as weighing fifty tons upon an acre. Twenty tons may be easily grown, and with fair tillage thirty tons.

The ground should be plowed about five inches deep and well manured; the entire manure, liquid and solid, is the best for corn. The land may be pulverized with a slanting-tooth harrow, followed by the roller and a second harrowing. The seed ought to be good and about three pecks to the acre; it may be drilled in or planted two and one half inches deep with the hand planter, the drills three feet six inches apart for the largest varieties, and the single plants six inches apart in the row. This gives the largest crop of fodder per acre. No crop pays better returns for good cultivation. After planting use the heavy two-horse roller.

Before the corn breaks the surface go over the field with the smoothing-harrow, using the round side of teeth to break the crust and aerate the ground. As soon as the corn begins to appear above ground repeat the harrowing each week until the

plants are one foot in height. Drive the smoothing-harrow over the rows without any trepidation, for it will save much hand labor and greatly increase the crop. After the maize is a foot high cultivate between the rows with a section of the same smoothing-harrow, so as to finely pulverize the surface to the depth of about one inch, or not more than two inches, making a fine powder for a mulch, and always level culture.

FLINT CORN.

In the Northern States and Canada the hardier varieties of flint corn are grown in order to mature a crop of seed before danger from frost. One of the heaviest yields ever reported is by Mr. Davis, of Scituate, Massachusetts. One acre produced two hundred and seventy-five baskets of ears, which weighed eleven thousand and three pounds. The corn was planted in drills three feet apart, four kernels every twenty-two inches. For tillage use the smoothing-harrow until six inches of growth, afterward a fine steel-tooth cultivator and six-prong hoe, giving clean level culture, and making a mulching surface of finely pulverized earth one to two inches in depth.

BARLEY.

Barley is a very important crop, both for green forage and barley meal, in the dairy ration. The Kinver Chevalier may be sowed every two weeks from July to October, the Manshury in March and April. It produces succulent crops in cool weather, and yields a heavy crop of grain in July, as high as ninety bushels per acre on rich clay loam with good tillage.

AMERICAN SAVOY CABBAGE.

Cabbages make an excellent food for dry cows and young stock, but are not desirable in rations for butter, as the flavor can be detected after every precaution. The Savoy variety is very palatable to cattle. The Schweinfurt Quintal yields immense crops, and is the best in quality of the white varieties. Plant eight ounces of seed to the acre, or two ounces for transplanting.

SUGAR BEETS.

The Imperial Sugar Beet is also a good food for dry cows and young stock, but does not give the best flavor to milk and butter. Under high culture thirty tons per acre may be grown, using about five pounds of seed in drills two feet apart and eight inches in the row.

MANGOLDS.

To be used for young stock and dry cows. Mangolds produce the largest of all root-crop yields, as high as seventy-five tons to the acre being reported in England with rich soil and high cultivation, with abundant moisture. Use six pounds of

seed to the acre. Keep the surface of the ground fine and mellow and free from weeds. The rows may be two feet apart and plants ten inches in the row.

CARROTS.

The carrot is the dairy root for cows in milk. The Danvers is a stump-rooted variety and easily harvested, but the Long Orange produces larger crops and is said to give a considerable degree of color to butter. In the cultivation of this root adopt those methods which reduce the cost to the lowest degree. The land must be rich, mellow, and free from stones. Saturate with liquid manure, plow twelve inches deep, pulverize with the Acme harrow, smooth with the roller, use the drill planter, making the rows straight and twelve inches apart ; plant thickly, using two pounds of seed to the acre. Run the cultivator between the rows as soon as the plants appear, and cross-harrow the field at right angles to the rows with a slanting-tooth harrow once or twice ; give clean culture. In harvesting use a swivel plow to turn a deep furrow away from each row. The six-prong hoe may be found useful both in cultivation and in gathering the crop, also wooden forks instead of steel shovels in handling the crop. Some farmers prefer to cut the tops with sharp hoes while in the row, but it is doubtful if that is an advantage, especially with the Long Orange variety. From twenty to thirty tons may be raised upon an acre. Steep the seed in warm water to hasten germination. They are easily harvested by pulling after a heavy rain. In dry weather they may be pulled after irrigating the ground.

PARSNIPS.

The parsnip (Long Smooth) will be found a valuable crop for butter cows, and can be allowed to remain in the ground until early spring. Cultivate and treat as carrots. Steep the seed in tepid water twelve hours before planting.

RUTABAGAS.

The rutabagas are only valuable for young stock and dry cows, because of the flavor they give to milk. Cultivate in drills. One pound of seed to the acre.

MEADOW SOILING CROPS.

It is well to have as great a variety as possible in soiling and also in winter feeding.

MEADOWS.

> " The murmur that springs
> From the growing of grass."—*Poe.*

For the production of hay crops, fields and meadows containing mixed grasses are desirable.

PROCTOR'S REGINA 35,665.

AT 2 YEARS OLD.

Rex—Cetewayo Type.

BAGGS HOTEL HERD.

T. R. PROCTOR, UTICA, NEW YORK.

SEEDING FOR AN EARLY MEADOW.

1.	Meadow Foxtail Grass (*Alopecurus pratensis*)	8 lbs.
2.	Green Meadow Grass (*Poa pratensis*)	8 "
3.	Meadow Oat Grass (*Arrhenatherum avenaceum*)	8 "
4.	Red Clover (*Trifolium pratense perenne*)	8 "
		32 lbs.

OR THIS.

1.	Orchard Grass (*Dactylis glomerata*)	3 bushels or 40 lbs.
2.	Red Clover	10 "
3.	Lucern	4 "
		54 lbs.

SEEDING FOR A LATE MEADOW.

1.	Timothy Grass (*Phleum pratense*)	10 lbs.
2.	Red-top Grass (*Agrostis vulgaris*)	6 "
3.	White Bent Grass (*Agrostis alba*)	6 "
4.	Alsike Clover (*Trifolium hybridum*)	6 "
5.	Meadow Oat Grass (*Arrhenatherum avenaceum*)	6 "
		34 lbs.

SEED FOR IRRIGATED MEADOWS.

Italian Rye Grass (*Lolium Italicum*)	10 lbs.
Perennial Rye Grass (*Lolium perenne*)	10 "
Timothy Grass (*Phleum pratense*)	4 "
Rough Meadow Grass (*Poa trivialis*)	3 "
Fowl Meadow Grass (*Poa serotina*)	3 "
White Bent Grass (*Agrostis alba*)	2 "
Red-top Grass (*Agrostis vulgaris*)	2 "
Meadow Foxtail Grass (*Alopecurus pratensis*)	2 "
Meadow Fescue Grass (*Festuca elatior*)	2 "
Alsike Clover (*Trifolium hybridum*)	3 "
	40 lbs.

THE CULTIVATION OF MEADOWS.

The importance of thorough tillage as a preparation for laying down grass lands cannot be too strongly presented.

The farmer who keeps himself abreast with the most progressive agriculturists will appreciate the advantages of using only the best machines and implements obtainable in order to keep his land in such a condition as to return him profit and pleasure.

The plowing should be so done as to leave the field in a level state, with no ridges or dead furrows to interfere with the mower and loader. The pulverization is effected by the slanting-tooth harrow, after which the roller prepares the land for the grass seed.

EXTRACT FROM MR. STIRLING'S TABLE SHOWING THE RESULTS OF COVERING SEEDS AT VARYING DEPTHS.

1.	2.	3.	4.	5.	6.
Agrostis stolonifera..........	13	500,000	0 to ¼	½ to ¾	1
Agrostis vulgaris............	12	425,000	....	....	..
Alopecurus pratensis.........	5	76,000	0 to ½	1 to 1¼	2¼
Arrhenatherum avenaceum...	7	21,000	½ to ¾	1½ to 1¾	4
Dactylis glomerata...........	12	40,000	0 to ¼	¾ to 1	2¼
Festuca elatior..............	14	20,500	0 to ¼	1 to 1¼	2¾
Lolium Italicum.............	15	27,000	0 to ¼	1 to 1¼	3¼
Lolium perenne.............	18–30	15,000	¼ to ½	1½ to 1¾	3½
Milium effusum.............	25	80,000	¼ to ½	1 to ¼	2¾
Phleum pratense............	44	74,000	0 to ¼	¾ to 1	2
Poa nemoralis...............	15	173,000	0 to ¼	½	1
Poa pratensis...............	13	243,000	¼	....	..
Medicago lupulina	63	16,000	0 to ¼	¾ to 1	1½
Medicago sativa.............	60	12,600	...	....	..
Trifolium hybridum.........	63	45,000	0 to ¼	½ to ¾	1¼
Trifolium pratense	64	16,000	0 to ½	1¼ to 1½	2
Trifolium p. perenne.........	64	16,000	0 to 1	1¼ to 1½	2
Trifolium repens............	65	32,000	0 to ¼	½ to ¾	1½

Column 1. Names of grasses and clovers.
Column 2. Average weight of seeds per bushel.
Column 3. Average number of seeds in one ounce.
Column 4. Depth by inches at which greatest number sprouted.
Column 5. Depth at which only one half sprouted.
Column 6. Least depth at which none germinated.

The seeds were sown in finely sifted loam, which was kept moist throughout the process of germination and under full exposure to light.

By the use of a proper harrow for covering the grass seed a greater proportion will germinate, and consequently a great saving may be made by lessening the amount of seed sown. The table given above showing the experiment of Mr. Stirling would

indicate that grass seeds need only a covering of from one eighth to one quarter of an inch in depth. James Smith, of Deanston, the inventor of the modern system of tile-draining on account of these experiments of Stirling's invented a harrow for the covering of small seeds at a shallow and uniform depth. The implement, which may be called the Serrated Disc Web Harrow, combines the operation of roller and harrow. "It consists of an iron chain web, connected together by discs of iron, which, lying obliquely upon their sides when in operation, roll around, thus tearing and abrading the surface of the ground, so as to expose and disturb the surface to depth enough to cover the small seeds strewn upon it.

"Any one who considers how many clover plants, for instance, will suffice to stock an acre, and what a vast number of seeds are contained in the twelve pounds or even twenty pounds which are now sown per acre, will admit the great room there is for the use of some contrivance for avoiding the common waste now permitted. It is only fair to add that the bush harrow forms a good substitute for the more expensive implement. It merely scratches the surface, but it wants to be weighted to make it as effective as the web harrow to compress as well as abrade the surface. The bush harrow is the cheaper, less effective—the web harrow the dearer, but more efficient implement for the purpose of covering small seeds."

OTHER ENGLISH METHODS.*

"When the seeds are to be sown among winter wheat it is expedient to begin by using the horse-hoe (supposing the wheat to have been drilled), as well to loosen the surface and produce a kindly bed for the seeds as to destroy weeds. In the case of broadcasted wheat a turn of the harrows secures the same end. In the case of the more recently sown barley all that is needed is to smooth the surface with the one-horse roller. Over the ground thus prepared the small seeds are distributed by a broadcast sowing-machine, which sows at once a space of fifteen or eighteen feet in width. The covering is then effected by simply rolling with the smooth roller, or by dragging over the surface the chain-harrow, which may either be attached to the sowing-machine or to a separate frame; or by using a roller, with a very light chain-harrow attached to it. On clay soils the chain-web is to be preferred; but on loose soils the roller (Crosskill) imparts a beneficial firmness, and, with its tail-piece of chain-web to fill up the indentations, gives an accuracy of finish which rivals the neatness of a newly raked garden-plot. We have long regarded this covering in of grass seeds as the most important use to which Crosskill's valuable implement is put. The only drawback to it is that it makes a heavy demand on the horse-power of the farm at a pressing season. As it can only be worked in dry weather it is advisable, when the land is in trim, to work it double tides, by means of a relay of horses.

* Encyclopædia Britannica.

This mode of procedure is alike applicable to the sowing of mixed clovers and grasses, and to that of the clovers alone, and is the course usually pursued in sowing for one or two years' 'seeds.'

"When it is intended to lay down arable land for several years, or to restore it to permanent pasture or meadow, it is always advisable to sow the seeds without a grain crop.

"This doubtless involves an additional cost at the outset, but it is usually more than repaid by the enhanced value of the pasture thus obtained. To grow the grasses well the soil should be pulverized to the depth of three or four inches only, and be full of manure near the surface. There is no better way of securing these conditions than by first consuming a crop of turnips on the ground by sheep-folding, and then pulverizing the surface by means of the grubber, harrow and roller, *without plowing it.* 'Never sow grass seed in time of drouth. The ground should be moist enough for rapid germination. Sow clover in early spring. Grasses do best sown in early autumn. Choose the morning calm as the best time to make an even seeding.'"

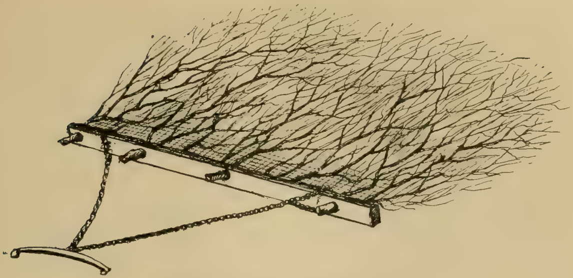
PERMANENT MEADOWS.

It is of the utmost importance that our farmers should give the requisite attention to all their grass lands, and especially to the establishment of permanent meadows.

The time for this work is the month of August. There is greater probability of thorough germination, *a year of time is saved*, and a good stand of grass is made to endure the winter.

This month gives the necessary time also to prepare the land in the best possible manner.

Take a field of oat, rye or wheat stubble or a second growth of clover, having manured the stubble heavily; the clover is equivalent to a liberal supply of barn-yard manure; turn clean furrows not more than five inches deep, and work immediately with the slanting-tooth harrow, making the land fine, mellow and smooth. Go over it again with the poly-section roller, so as to make it firm and obliterate every inequality of surface. A force-feed grass-seeder may be attached to the roller for a second rolling, and a brush or chain-harrow follow, drawn by the same team. Select the seed according to the tables given above or the lists given for pastures. If the plowing has been smooth and of even depth and three or more harrowings given with the cutting edge of the teeth, and the seed covered pretty uniformly to the depth of one eighth of an inch, and the finish given with the fine brush or chain-harrow, you will have provided a mellow seed-bed well firmed, and having a slightly scarified surface ready to receive the first shower of rain that shall promote rapid germination and growth. If the surface has been well fined and levelled by the harrow the rolling may be omitted. In every case the finish must be made by the grass-seed harrow to prevent the crusting, which would be destructive to grass growth.



BRUSH HARROW FOR GRASS SEED.

In a month from sowing, if the usual August rains have fallen, the field will be a sheet of vivid green. Do not pasture the ground. The following season will yield one or two crops of hay. Four hundred pounds per acre of bone meal may be harrowed in with the seed with lasting benefit. Subsequent manurings with wood ashes and diluted stable manure from the sprinkling-cart, combined with irrigation, where practicable, will make a permanent meadow yielding a large annual profit.

In the Southern States lucern and cow peas, best planted in narrow drills and kept clean of weeds, make very nutritious hay when cured in shade.

The millets and Johnson Grass are important hay grasses.

In some localities other grasses may be added for permanent meadows. The Italian rye grass (*Lolium Italicum*) is rich in protein, very succulent, and will prove a valuable addition to irrigated meadows.

Barley and rye may be sown together from the middle of July to the first of October, and the barley cut until severe frosts harden the ground. The rye will then furnish an early spring forage. In the culture of meadow grasses the land needs deep and thorough tillage ; the seed should be rolled and afterward dragged in by a fine brush harrow, covering the seed lightly. Grasses do not thrive as well when sowed with grain crops, but should have the ground without such shading and choking, while grains yield better crops thinly seeded in drills with light surface cultivation.

In a permanent meadow a mixture of grasses is more profitable, as their roots occupy different areas, and many varieties need company to prevent their dying out. It is believed that timothy, red top and oat grass mutually protect each other.

Another very important point in the preservation of meadows is that they should never be pastured. Deterioration by depasturing and by too late mowing are very speedily ruinous to the best meadows.

For winter protection meadows need a growth of about from four to six inches of aftermath. This autumnal growth corresponds to the depth of root growth and also acts as a winter mulch to prevent killing by the freezing and thawing alternations that destroy grasses having a short top and shallow root. The natural mulch also becomes of great value as a fertilizer in early spring. Meadows preserved by this method and saturated fall and spring with liquid manure will yield large crops perpetually.

BUNT AND SMUT.

"Dombasle's method for treating the bunt fungus in wheat might be applied to the seeds of all grains and grasses to destroy smut of all species with favorable results.

"Thoroughly wet the grain with a solution of sulphate of soda; the wheat or other grain is then mixed with quicklime, which combines with the sulphur to make sulphate of lime (gypsum), which acts as a manure, while the caustic soda destroys the spores of the fungus."

Professor Henslow experimented with sulphate of copper, using two ounces or more to the bushel, which should be used alone. It is not invariably successful in destroying the spores.

Professor Henslow says: "It has always appeared strange to me that practical agriculturists are accustomed to pay so little attention to the raising of pure seed crops. There may be reasons which I do not properly appreciate that would render it inexpedient to cultivate a seed crop; but I should have thought that it was always worth while for every farmer to set aside some portion of ground to be more carefully tended than the rest, for the purpose of securing good and clean seed. Among other reasons for such a practice, he would then be able to weed his crop from every plant infected with bunt or smut before the fungi ripened."

PASTURAGE.

"The waves are a joy to the sea-mew, the meads to the herd."—*Swinburne.*

Where land is cheap, or not specially adapted to soiling, pasturing will be the practice. Some can carry on partial soiling and pasturage with profit.

The essentials of a good pasture are: a soil of more than average richness and sufficiently pervious to rain and flowing water; a persistent growth of sweet, luscious grasses and clovers in great variety; a never-failing supply of pure running water; and fences that will turn not only cattle, but pigs, ducks and turkeys. There should be no quagmires or sloughs, nor streams or ponds where cows can wade deep enough to chill the udder, nor thickets of briers to scratch and wound the teats.

The greatest variety of grasses and aromatic plants edible for cattle is desirable in a pasture. Some of our wild pastures contain more than forty species of grass, besides other plants relished by cows. If the land is arable select the following grasses and clovers for a northern permanent pasture:

For Permanent Pasture. (1.)

1.	Meadow Foxtail (*Alopecurus pratensis*)	5 lbs.
2.	Tall Fescue (*Festuca elatior*)	5 "
3.	Devon Eaver (*Lolium perenne Devonii*)	5 "
4.	Green Grass (*Poa pratensis*)	2 "
5.	Pacy Grass (*Lolium perenne Pacyii*)	2 "
6.	Red-top (*Agrostis vulgaris*)	2 "
7.	White Bent Grass (*Agrostis alba*)	2 "
8.	Blue Grass (*Poa compressa*)	2 "
9.	Orchard Grass (*Dactylis glomerata*)	2 "
10.	Fowl Meadow Grass (*Poa serotina*)	2 "
11.	Rough Meadow Grass (*Poa trivialis*)	2 "
12.	Meadow Fescue (*Festuca pratensis*)	2 "
13.	Oat Grass (*Arrhenatherum avenaceum*)	2 "
14.	Perennial Red Clover (*Trifolium p. perenne*)	2 "
15.	Alsike Clover (*Trifolium hybridum*)	2 "
16.	White Clover (*Trifolium repens*)	1 "
		40 lbs.

Seed for Permanent Cow Pasture. (2)

Perennial Rye Grass (*Devon Eaver*)	4 lbs.
Italian Rye Grass	4 "
Orchard Grass	4 "
Green Meadow Grass (*Poa pratensis*)	4 "
Chicory (*Cichorium Intybus*)	4 "
Burnet (*Poterium sanguisorba*)	4 "
Alsike Clover	2 "
Perennial Red Clover	2 "
White Clover	2 "
Meadow Foxtail Grass	2 "
Timothy Grass	2 "
Meadow Fescue Grass	2 "
Red-top Grass	2 "
Fowl Meadow Grass	2 "
White Bent Grass	2 "
Pacy Grass (*Lolium perenne Pacyii*)	2 "
Blue Grass (*Poa compressa*)	2 "
Oat Grass (*Arrhenatherum avenaceum*)	2 "
Lucern (*Medicago sativa*)	2 "
	50 lbs.

The perennial red clover is a variety that should be used in all mixtures.

The green grass sometimes called "Blue Grass" and "June Grass" is in certain localities liable to "smut." Seed should be selected where there is no danger of such disease. *Mow all pastures before seeding of grasses to prevent smut.*

The true blue grass (*Poa compressa*) is especially valuable upon dry soils, as it resists long drouth. Combined with white clover it makes the richest pasturage. Under trees and woods it is best to sow the orchard grass, also drop-seed grass (*Muhlenbergia diffusa*). The latter is a late grass flowering in August and September, and grows to a height of one and a half feet. It is believed to be a good butter grass, and many think it gives a fine flavor to butter. It deserves investigation. It grows only in woods. The sweet-scented vernal grass and vanilla grass, which are sometimes recommended because of their pleasant odors, are probably of little or no value, as cattle do not relish them and they occupy the land as weeds.

SOUTHERN PASTURE.

In the extreme South good pasture grasses are grown with difficulty or not at all. There are some grasses that are very hardy and make terrible pests in cultivated fields, which, however, yield rich pasture. Such are the Johnson grass (*Sorghum halapense*), which is of great value, the Bermuda grass and the crab grass (*Panicum sanguinale*), also the juicy grass (*Paspalum laeve*). The perennial grass (*Paspalum ovatum*) promises to be of great value in the Gulf States, as it is said to thrive on very dry land in the longest drouth.

Texas meadow grass (*Poa arachnifera*), a grass native to the region of the Red River, Louisiana, and elsewhere in the Southwest, is claimed to be more valuable than the green meadow grass (*Poa pratensis*), and is of larger growth. It makes excellent winter pasture, as it has a rapid growth, sometimes making ten inches in as many days in Texas during the winter months.

It is very leafy, makes a dense, permanent sod, and is therefore a fine lawn grass.

It is worthy to be widely introduced and extensively cultivated in all parts of the country where it will prove hardy.

For Southern winter pasture the following list of grasses is recommended:

1. Texas meadow grass (*Poa arachnifera*).
2. Orchard grass (*Dactylis glomerata*).
3. Tall oat grass (*Arrhenatherum avenaceum*).
4. Italian rye grass (*Lolium Italicum*).

The Johnson grass (*Sorghum halapense*) may be pastured or used for a soiling crop. Swine are very fond of its creeping root-stocks.

Lucern requires very rich, warm land. It must be sown in drills eighteen inches apart, using about twenty pounds of seed to the acre, and a dressing of two hundred pounds of bone-powder planted with the seed by the drill. Give thorough

cultivation every fall and a rich dressing of cow-manure. Keep down all weeds. It will give four cuttings a year in the Southern States.

PASTURE AND FARM FENCES.

The coming fence is a combination of wire and hedge. Prim is easily grown from cuttings, has a foliage of soft, beautiful green, which remains bright from eight to ten months of the year. A barbed wire fence, of six wires, covered by a prim hedge about eighteen inches wide at the base and five or six inches wide at the top, with a height of five feet, is the ideal fence. The hedge forms a covering or screen from injury by the wire, and the barbs effectually turn all intruders, whether man, beast or fowl. The posts may be set thirty feet apart, and the prim plants nine to twelve inches apart, alternating on either side of the lowest wire, or, if the wires are set on alternate sides of the posts, the plants may be set on a line with the centre of the posts. Five wires may be set, four inches apart at the bottom and widening to sixteen at top. Such a fence would be ornamental to the farm and a very pleasing attraction to the landscape. The wire fence should have an occasional rod of iron set with the posts and soldered to the wires, at least one at each corner of the field, as a protection to cattle from lightning during storms. Other hedge plants worthy of trial are hemlock, spruce, sweetbrier, buckthorn, clethra and althea.

TETHERING.

An economical method of pasturing on small farms is by the use of the tether. It is the practice in the Island of Jersey, and to some extent in America.

This confines the animal to a small area and necessitates a closer and more thorough use of the grass. The removal of the tethering iron or stake a few inches four or five times each day allows the cropping of another space. Water should be supplied every three hours. The tethering iron should have a ring and swivel at the top, and the animal may be secured by a chain of fine links attached to the headstall. The chain should have several link swivels to prevent kinking. A bull may have the chain pass through his muzzle-ring and fasten to a strong leather strap buckled around the base of the horns.

WATER SUPPLY IN PASTURES.

An abundant supply of pure water in every pasture is essential to successful dairying.

One or more troughs or tanks in every field, raised so that animals cannot step or plunge into them, may be filled by pipes conducting from hillside springs of pure water, or from a reservoir filled by a windmill or other power pump. These troughs should be in the open field and most accessible, never in a corner, where they endanger the timid or invite to hooking and goring.

RENOVATION OF PASTURES.

Go over the pastures every year, in August, and root out or cut down every plant, shrub or tree that is unprofitable to you.

The liquid-manure cart will prove of great advantage in seasons of drouth where irrigation is impracticable in any other way. Irrigation and fertilization will do much to keep up a fresh growth in parching weather, provided the ground be well saturated with very dilute manure. Where certain varieties or species of plants and grasses are deficient it is well to go over the pastures in the latter part of August with a steel-toothed harrow, breaking and scarifying the surface sufficiently, when the desired mixture of seeds may be scattered broadcast and rolled or brushed into the scarified ground. If rains do not soon follow, irrigation, by some method, will hasten germination of the seed. All plants having bitter or acrid juices should be cut before seeding in all fields and pastures, so as to exterminate them. Many weeds or stout plants may be destroyed in the early stages of growth by touching the crowns with a wand dipped in a vessel of sulphuric acid. Finely pulverized bones and wood ashes produce sweet grasses, and are the most lasting of manures for pastures.

Clover pastures require a liberal dressing of lime and bone-powder.

RULES FOR PASTURING.

1. Allow no sheep upon new pasture within two years, as they will destroy it.
2. Mow the first growth in early flowering to prevent smut and woodiness.
3. Roll frequently and stock with young cattle only until the second season is over.
4. Never stock pastures in spring until genial weather is fairly established.
5. Never allow the grasses to run to seed or parts of the field to be eaten bare and others to get rank and coarse.,
6. Duly spread about all dung, remove all stagnant water, and extirpate all weeds.
7. At midsummer have the pasture grazed or cut so close that there shall be no dead or dry herbage on any part of it.
8. Always adapt the stock, as regards breed, size, condition and numbers, to the actual capabilities of the pasturage.
9. Secure to the stock at all times a full bite of clean, fresh-grown, succulent herbage.
10. In moving stock from field to field take care that it always be to better fare.
11. Have pasture sheds built and furnished with bedding and absorbents, that the manure may be saved while the cattle are sheltered from scorching heat or cold storms.

THE RATION.

At all times the dairy cow, if she be the best type of Jersey, will exhibit a good appetite, the largest digestive power, and great capability for transforming meadow and farm products, in the shape of grass, hay and meal, into milk and cream. Whatsoever is produced in milk, cream, butter and cheese must come from the food which the animal eats. How important, then, that the art of feeding should be thoroughly mastered by all who have charge of dairy cattle.

The cow must be supported by food. It requires two thirds of a full ration to sustain a cow in good condition. This is called the food of support, and is simply appropriated to keep the animal alive. If the animal takes more exercise than is required, or is subjected to very low temperature, or to violent changes of weather and cold storms, or is misused in any way, as by being kicked or beaten by harsh attendants, or worried by dogs, or irritated by being placed with strange cattle, or put under any unusual nervous excitement, there must be a compensation for the loss, for the wear and tear of the system, as far as the law of equivalents can be made to operate, before there is any production of milk whatever.

All the profit must come from the other third of a full ration or from what is used above the two thirds necessary for maintenance. If the cow is not made profitable by right feeding there will be a loss.

The cow must be under the best conditions as to exercise, the maintenance of animal heat and protection from the weather, and then fed so that she will produce the greatest amount of rich milk, and a calf, year by year, to a full age. The cow is the largest producer of food among animals, and consequently the most profitable for economical feeding.

The ration for cows must support animal heat and contribute to maintain all the tissues of the body, and in addition give the largest possible yield of milk of the best quality. If the average temperature is 70° it requires only food enough to raise this temperature to 101°, or to overcome a variation of about 31° between the air and blood-heat. If the stables are kept at an average temperature of 60°, then 10° are added, thus requiring additional food. If the stables are cold and the average winter temperature is 40°, then the temperature must be raised 61° to maintain normal temperature.

Growing cattle require a larger proportion of the elements for maintaining animal heat than milch cows.

In order to save a waste of rations the stable should be made comfortable and of the right temperature in summer and winter, and the animals should be protected from all sources of worriment and annoyance.

The milch cow, the growing animal and the mature bull must each be fed a ration suited to the special requirements of each. The cow must have that proportion

of protein, carbo-hydrates and fat suited to the highest productiveness of the best quality of milk and butter and the development of the fœtal calf. The growing heifer must have a ration suited to prepare her to become a perfect cow. The growing bull and the mature bull must each have an appropriate ration, which differs in composition according to age and service.

A PART OF PROFESSOR TANNER'S TABLE OF FODDER VALUES.

WEIGHT REQUIRED TO PRODUCE ONE POUND OF MEAT.

Linseed Cake and Peas, equal parts	4½	lbs.
Linseed Cake	5 or 6	"
Barley	6	"
Rape Cake	6	"
Cotton Cake	6	"
Oats	7	"
Beans	8	"
Peas	8	"
Clover Hay	12	"
Swedes	150	"
Mangolds	150	"
Carrots	160	"

Professor Johnson, of the Connecticut Experiment Station, has translated the feeding standard tables of the German experimenter, Dr. Wolff, which show what has been found to work well on a small scale and may be useful to the Jersey breeder in aiding him to form a better standard suited to his own herd for special purposes. Great variations may be made from these standards, and farther on in the history of individual Jerseys will be given the rations for tests from which the great butter records have been made.

According to Wolff, thirty pounds of young clover hay will keep a cow in fair milk: this contains of dry organic substance twenty-three pounds, of which the digestible substance is: protein, 3.21; carbo-hydrates, 11.28; and fat, 0.63. This varies from the standard in the table by .71 pounds more of protein, .22 pounds less of carbo-hydrates, and .23 pounds more of fat.

The ration must not only contain the correct proportion of nutrient substance, but it must always be combined in such a way as to be most palatable and in the most convenient form for mastication.

Special rations must be fed to cows that are producing a very large amount of butter, and also to service bulls and choice calves. Special feeding that keeps a cow up to the limit of her full capacity has been proven a source of permanent

improvement in individual cows, and also a governing factor in the production of better calves, the cow producing her best heifers, according to Stewart, at the period of her highest feeding and greatest productiveness. The best cows of the Jersey breed may be greatly improved in both quantity and quality of their milk by high feeding of well-selected rations.

Feeding Standards.

PER DAY AND PER THOUSAND POUNDS, LIVE WEIGHT.

Age. Months.	Animals.	Total Organic Dry Substances.	Nutritive Digestible Substances. Protein.	Carbo-hydrates.	Fat.	Total Nutritive Substances.	Nutritive Ratio.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
	Oxen moderately worked.....	2.40	1.6	11.3	0.30	13.20	1 : 7.5
	Cows in milk...............	2.40	2.5	12.5	0.40	15.40	1 : 5.4
	GROWING CATTLE. Average Live Weight per Head.						
2 to 3	150 pounds..................	22.0	4.0	13.8	2.0	19.8	1 : 4.7
3 to 6	300 "	23.4	3.2	13.5	1.0	17.7	1 : 5.0
6 to 12	500 "	24.0	2.5	13.5	0.6	16.6	1 : 6.0
12 to 18	700 "	24.0	2.0	13.0	0.4	15.4	1 : 7.0
18 to 24	850 "	24.0	1.6	12.0	0.3	13.9	1 : 8.0

PER DAY AND PER HEAD.

2 to 3	150 pounds..................	3.3	0.6	2.1	0.30	3.00	1 : 4.7
3 to 6	300 "	7.0	1.0	4.1	0.30	5.40	1 : 5.0
6 to 12	500 "	12.0	1.3	6.8	0.30	8.40	1 : 6.0
12 to 18	700 "	16.8	1.4	9.1	0,28	10.78	1 : 7.0
18 to 24	850 "	20.4	1.4	19.3	0.26	11.96	1 : 8.0

Professor Horsfall says it requires twenty pounds of good meadow hay, besides the food of support, to produce eighteen quarts (forty pounds) of milk a day. The cow cannot consume this amount of hay above the ration for her maintenance, and the extra food must be sought in more concentrated forms, such as are rich in

protein, phosphoric acid and oils, and these be selected with reference to economy. His stables in winter were kept at 60° temperature. His ration for milk consisted of rape cake, five pounds, bran, two pounds, mixed with bean straw, oat straw, and oat shells in equal parts, fed three times a day, all they would eat. These materials were moistened, mixed thoroughly, then steamed and fed warm. Each cow had, in addition, from one to two pounds of bean meal, according to her quantity of milk, and when eaten, green food, consisting of cabbages from October to December, kohl-rabi until February, and mangolds till grass-time. To preserve a good flavor the green food was limited to thirty or thirty-five pounds daily, and after each feed four pounds of meadow hay or twelve pounds daily to each cow, with all the water they would drink twice a day.

This ration was given to produce quantity of milk and prepare cows for the second stage of fattening for the butcher. His cost of feed was twenty-seven cents a day for each cow, and the milk from six cows averaged $46.83 for one hundred and ninety-one days, and the manure was equal to $29.49 per cow for the same length of time.

The English, German and American experiments demonstrate that *two parts of all food are required to keep the cow alive, and one part for production and profit.* They also show that the oil contained in the food is insufficient to supply the needs of the animal, and that the fat must in part be derived from the carbo-hydrates in the food.

Rations for Jersey Cows in Milk when yielding from Two to Three Pounds of Butter Daily.

In the month of May green rye and barley may be cut and mixed with clover hay or extra meadow hay of mixed grasses and clover, twenty-five to fifty pounds of rye, and twelve to sixteen pounds of hay, given in four feeds, at 6 and 9 A.M. and 3 and 6 P.M., allowing the time from 10 A.M to 3 P.M. for exercise in the open air. Until the cows are accustomed to the green food it is best to graduate the proportions for a few days, giving a ration as follows, for cows of nine hundred pounds live weight:

MAY.

10 lbs. Best Mixed Hay, 25 lbs. Green Rye and Barley, 4 lbs. Wheat Bran, 2 lbs. Corn Meal.	Cut and mixed for two feeds.
10 lbs. Parsnips, 4 lbs. Barley Meal.	Noon feed.

½ oz. Salt at each feed.

JUNE.

2 lbs. Best Hay,
10 lbs. Green Rye or Rye Grass,
20 lbs. Green Clover,
25 lbs. Orchard Grass,
25 lbs. Green Barley.
} Mixed for two feeds.

1 quart of Wheat Bran at each milking.
$\frac{1}{8}$ oz. Salt at each feed.

JULY.

2 lbs. Best Hay,
25 lbs. Green Clover or Clover and Timothy,
25 lbs. Green Oats or Oats and Peas,
20 lbs. Green Wheat or Alsike,
20 lbs. Green Hungarian Grass, in early blossom.
} Two feeds.

1 quart of Wheat Bran at each milking.
$\frac{1}{8}$ oz. Salt at each feed.

AUGUST.

2 lbs. Best Hay,
20 lbs. Italian Rye Grass,
20 lbs. Italian Millet and Hungarian Grass,
30 lbs. Green Sweet Corn Fodder,
20 lbs. Alsike or Green Wheat.
} Two feeds.

1 quart of Bran at each milking-time.
$\frac{1}{8}$ oz. Salt at each feed.

SEPTEMBER.

2 lbs. Best Hay,
25 lbs. Sweet Corn (with ears in milk),
10 lbs. Green Barley and Hungarian Grass,
10 lbs. Millet, or $\frac{1}{2}$ bushel Crushed Ripe Apples,
10 lbs. Wheat in early bloom.
} Two feeds.

1 quart of Bran at milking.
$\frac{1}{8}$ oz. Salt at each feed.

OCTOBER.

2 lbs. Best Hay,	Two feeds.
25 lbs. Sweet Corn (with ears in milk),	
20 lbs. Green Barley,	
10 lbs. Green Wheat.	

1 quart of Rye Bran at milking.
Given upon 1 peck of Crushed Ripe Apples.
$\frac{1}{8}$ oz. Salt at each feed.

NOVEMBER.

20 lbs. Green Corn Fodder,	Two feeds.
10 lbs. Best Hay,	
10 lbs. Green Barley,	
2 lbs. Oatmeal,	
2 lbs. Barley Meal.	
4 lbs. Bran,	Midday feed.
10 lbs. Pumpkins.	

$\frac{1}{16}$ oz. Salt at each feed.

DECEMBER.

15 lbs. Best Early Hay of Orchard Grass and Clover,	Two feeds.
6 lbs. Wheat Bran,	
4 lbs. Maize Meal,	
2 lbs. Barley Meal,	
4 lbs. Oatmeal.	
$\frac{1}{2}$ lb. Linseed Meal,	Noon feed.
10 lbs. Pumpkins.	

$\frac{1}{16}$ oz. Salt at each feed.

JANUARY.

5 lbs. Green Oat Hay,	Daily ration for two feeds.
15 lbs. Corn Stover,	
6 lbs. Rye Bran,	
2 lbs. Barley Meal,	
4 lbs. Maize Meal,	
4 lbs. Oatmeal.	
$\frac{1}{2}$ lb. Linseed Meal,	Noon feed.
10 lbs. Carrots.	

$\frac{1}{16}$ oz. Salt at each feed.

HAZEN'S NORA 4791.

AT 8 YEARS OLD.

Rajah—Bismarck—Splendid Type.

GREEN MOUNTAIN HERD.

MOULTON BROTHERS, WEST RANDOLPH, VERMONT.

FEBRUARY.

8 lbs. Best Green Clover Hay, 8 lbs. Green Millet Hay, 6 lbs. Rye Bran, or Wheat Shorts, 4 lbs. Maize Meal, 2 lbs. Barley Meal, 4 lbs. Oatmeal.	Two feeds.
½ lb. Linseed Cake Meal, 10 lbs. Carrots.	Noon feed.

$\frac{1}{16}$ oz. Salt at each feed.

MARCH.

4 lbs. Green Clover Hay, 15 lbs. Green Corn Stover, 6 lbs. Rye Bran or Wheat Shorts, 4 lbs. Maize Meal, 6 lbs. Oatmeal.	Two feeds.
10 lbs. Mangolds or Parsnips, 1 lb. Linseed Meal.	Midday feed.

$\frac{1}{16}$ oz. Salt at each feed.

APRIL.

8 lbs. Green Millet Hay, or 25 lbs. Green Rye, 8 lbs. Cow Pea Hay or Clover Hay, 6 lbs. Rye Bran, 6 lbs. Oatmeal, 2 lbs. Maize Meal.	Two feeds.
10 lbs. Parsnips, ½ lb. Linseed Meal.	Midday feed.

$\frac{1}{16}$ oz. Salt at each feed.

A CHEAP WINTER RATION.

10 lbs. Green Corn Stover, 8 lbs. Green Millet Hay, 4 lbs. Oatmeal, 6 lbs. Rye Bran, 3 lbs. Maize Meal, 2 lbs. Linseed Meal.	Two feeds.

$\frac{1}{16}$ oz. Salt at each feed.

Use the "Crusher" machine for cutting, comminuting and pulverizing all the corn fodder, and the Hay Cutter for all other grasses, then moisten and mix with the ground feed.

RATION FOR WINTER MILK.

3 lbs. Clover Hay.
15 lbs. Corn Stover, well cured.
4 lbs. Oatmeal.
2 lbs. Corn Meal.
8 lbs. Wheat Bran.
2 lbs. Linseed Meal.
$\frac{1}{16}$ oz. Salt at each feed.

OR THIS, FOR WINTER MILK.

	Cost.
18 lbs. Corn Fodder, well cured	4.5 cents.
5 lbs. Best Clover Hay	2.0 "
8 lbs. Wheat Bran	6.0 "
4 lbs. Corn Meal	3.0 "
2 lbs. Linseed Meal	3.0 "
$\frac{1}{16}$ oz. Salt at each feed.	18.5 cents.

STANDARD WINTER RATION FOR A BREEDING HERD.

10 lbs. Corn Fodder, cured green.
5 lbs. Rowen Hay.
1½ qts. Oatmeal.
1 qt. Maize Meal.
1 qt. Wheat Bran.
1 pt. Linseed Meal.
6 qts. Parsnips.
$\frac{1}{16}$ oz. Salt at each feed.

The corn fodder to be cut in four-inch lengths, or crushed in the "Crusher," then well moistened and mixed with the grain, one half at 6 A.M., one half at 6 P.M. (Bundles of corn-stalks may be cut in four-inch lengths with the bucksaw.)

The rowen hay at 12 M.

The parsnips at 3 P.M.

Full watering at 10:30 A.M. and 5:30 P.M., with water at 65° temperature.

WINTER RATION FOR YELLOW BUTTER.

Same as above, provided the corn fodder and hay are cured so as to retain their green color. The parsnips also aid in giving butter color in winter.

Give double the quantity of salt with green succulent crops, and always mix dry hay or oat straw with green clover.

RATION AT ECHO FARM, LITCHFIELD, CONN., AS REPORTED BY CONNECTICUT AGRICULTURAL EXPERIMENT STATION, 1881.

Daily Ration per Head.

KINDS OF FODDER.		Dry Matter.	Digestible.		
			Protein.	Carbo-hydrates.	Fat.
	lbs.	lbs.	lbs.	lbs.	lbs.
Hay..........................	23.52	15.72	0.66	8.37	0.14
Provender*....................	4.69	3.88	0.34	2.54	0.13
Bran..........................	2.50	2.15	0.33	1.16	0.05
Mangolds	7.50	0.64	0.12	0.43	....
Total		22.39	1.45	12.50	0.32
Total per 1000 lbs. live weight		25.16	1.63	14.04	0.36
Standard		24.00	2.50	12.50	0.40

Total digestible matter, 16.03.

Nutritive ratio, 1 : 1.9.

Order of feeding: Morning, Hay, Provender and Bran.
Noon, Hay.
3 P.M., Mangolds.
Night, Hay, Provender and Bran.

RATION RECOMMENDED FOR JERSEY COWS ONE MONTH BEFORE CALVING.

In Winter: 10 lbs. Best Meadow Hay.
10 lbs. Corn Stover.
10 lbs. Rutabagas.
2 lbs. Oatmeal.
½ lb. Oil Cake Meal.
$\frac{1}{16}$ oz. Salt at each feed.

OR THIS.

10 lbs. Rowen Hay.
6 lbs. Oat Straw.
15 lbs. Rutabagas or Cabbage.
2 lbs. Oatmeal.
⅛ oz. Salt.

* Equal parts ground oats and maize.

DARLINGTON RATION.

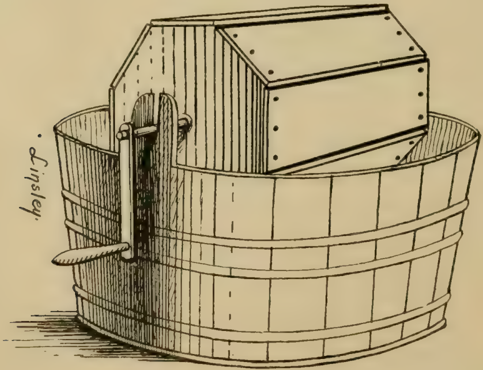
At the "Darlington" dairy of grade cows the following ration is fed in order to give a good flavor to the butter, which has a reputation in the market for quality, flavor and uniformity of appearance throughout the year:

Best Clover Hay	8½ lbs.
Corn Meal	8½ "
Wheat Shorts	8½ "

No cornmeal or shorts are used if in the least degree fermented, but should such fermented meal or bran be sent from any dealer, it is immediately returned, as the feeding of fermented food would destroy the quality of the butter.

DRYING OFF COWS.

If it is desired that a persistent milker shall be thoroughly dry before calving turn her into a box-stall and feed her with a ration of thirty pounds of oat straw. Straw is a good ration to make cows dry off at any time, and therefore not a desirable food except for the sole purpose of drying.



CARROT CLEANER.

SUMMER FEEDING.

In summer give the cow what she will eat of mixed forage plants or good pasture alone. All green crops are better after a few hours of wilting in the sun, especially sweet corn.

No forage crop can be fed when wet by rain or dew without injury, because of the added excess of moisture, which causes indigestion and a diminished yield of milk.

Roots like all the greens and apples must be fed in small quantities at first, gradually increasing to the full proportion in the mixed ration.

RATION FOR THE JERSEY BULL.

SUMMER.

Let him be tethered in good pasture, or give from seventy-five to one hundred pounds of green forage with from one to three pounds of oatmeal, according to size and service. Give salt at each feed.

WINTER.

12 lbs. best Clover or Cow Pea Hay.
3 lbs. Oatmeal.
2 lbs. Linseed Meal; grain mixed with the cut hay.
4 to 6 lbs. Carrots, Mangolds, Rutabagas or Parsnips.
$\frac{1}{8}$ oz. Salt.
Feed three times daily, and give water as often.

RATION FOR THE CALF.

The calf is best fed with the utmost regard to punctuality, three times daily, from birth, upon the full milk of its own dam, when practicable. Let the calf suck the dam one day, then remove it to its own softly-bedded stall. The second and third days it may be taught to drink from a pail or bucket by firmly holding the muzzle in the warm milk while two fingers of the right hand are inserted in its mouth. The calf will take from a quart to three pints of the colostrum three times daily, and a gradually increasing quantity of his dam's milk. This should be given as soon as a sufficient quantity is drawn, that it may not lose its normal temperature of $101\frac{4}{5}°$. After one month, if it is desired to use the cream for butter, the calf can have one third of the dam's milk mixed with two thirds warm skim-milk from the Separator; or, if some other mode of cream-raising is practised, the sweet skim-milk should be warmed to 102° or 103° by careful test. It is better to give six quarts a day in three than the same in two feeds. At the third month the calf can have entire skim-milk, to which should be added a gruel made from flaxseed. It is well to begin the addition of the gruel the second month,

to supply the change from whole milk with cream to a partial ration. A pint of flaxseed and a pint of "oilmeal" boiled in ten quarts of water, or flaxseed alone in six times its bulk of water, will make a gruel nearly rich enough to supply the lack of cream in the skim-milk. Mix this, one to two parts, in the skim-milk, and feed at a temperature of 102°. Always use the thermometer, and a good one. From the beginning add a little rennet or lacto-rennetine to the milk before feeding, and a gradually increasing allowance of salt at each feed, beginning with a few grains only.

If the Sucking Feeder is used it may be fastened to the inside of the stall and the milk poured in through the door or a port-hole.

The rennet renders digestion and assimilation easy.

Let the calf be satisfied three times a day until six months old. During the fifth month or earlier teach it to eat a small handful of oats. If the food has a tendency to produce diarrhœa diminish the quantity at once by three fourths, or substitute for a few meals, in the milk, a quart of coarse wheat flour or pure wheat meal instead of the linseed. But always diminish the food at once upon the first symptoms of indigestion. Pea meal may be combined with the flax meal or flaxseed if desired, or when the calf is two months old one pound of oatmeal or wheat middlings may be added to its ration. Twenty pounds of skim-milk may be sufficient in the daily ration until the fourth month. If the milk is diminished the oatmeal must be increased.

OTHER RATIONS FOR CALVES.

WHEY RATION.

There is much valuable nutriment in the whey after cheese-making, but the fat and casein extracted must be supplemented by a sufficient amount of grain food to supply the nitrogenous elements, and thereby render the mixture an equivalent to normal milk. Add a little salt to each feed.

FORMULA FOR YOUNG CALF.

Whey	1 gal.
Oil Cake	1/4 lb.

Mix when hot, and feed at 102°.

FORMULA FOR CALF AT ONE MONTH OLD.

Whey	1 gal.
Oil Cake	1/4 lb.
Oatmeal	1/4 lb.

Mix hot, and feed at 102°.

HAY TEA RATION FOR CALVES ONE MONTH OLD.

Skim-Milk	1 gal.
Hay Tea (decoction of early cut hay)	1 gal.
Flaxseed (decoction)	$\frac{1}{4}$ lb.
Wheat Middlings	$\frac{1}{4}$ lb.

Mix the milk after boiling the other ingredients well and straining, and feed at 102°.

Gradually increase with age the grain elements. Add a little Salt.

RATION FOR CALF FROM FOURTH TO SEVENTH MONTH.

10 lbs. Skim-Milk.
2 lbs. Oatmeal.
1 lb. Linseed Oil Meal.

Add $\frac{1}{4}$ teaspoonful of Prepared Rennet; and Whole Oats to eat midway between feeds. Give a little Salt.

OR THIS.

$$\left.\begin{array}{l}\text{20 lbs. Skim-Milk,}\\ \text{1 lb. Oatmeal,}\\ \tfrac{1}{2}\text{ lb. Flaxseed,}\\ \text{20 drops Prepared Rennet.}\end{array}\right\}\text{Two Feeds.}$$

A half pint Whole Oats, dry, at noon. Add a small quantity of Salt.

This is a ration for a very large Jersey calf; a small calf may thrive on much less than this. During the first year or from six months onward the young heifer should be fed chiefly on hay, so as to expand and develop the digestive organs to a capacious size. Many breeders prefer to keep calves from grass until a year old. Some prefer to keep them upon whole milk for three months, gradually introducing skim-milk until the calf is six months old, returning to whole milk if the calf scours, always reducing the quantity, and giving it at a higher temperature, from 125° to 130° Fahrenheit. Bran has an irritant effect on the bowels of a calf and should not be used. The greatest care in raising calves is necessary, that they may always have just enough, and never too much. Hundreds of valuable calves are killed by overfeeding; especially by persisting in the overfeeding after serious disorder of the bowels threatens to destroy the animal. It is the most important department of feeding. Some breeders rarely or never lose a calf, others have continual disasters from their own mismanagement.

ENSILAGE.

The storing of green forage crops in water-tight vats under enormous pressure is the invention of M. Goffart, of France.

For centuries green crops had been buried in ditches and caverns and subject to great loss by fermentation and decay. The method of Goffart, although a great improvement upon the old, by largely excluding the air and arresting the fermentation at a certain point, still has many serious objections. Its inventor and some of its advocates have undoubtedly claimed too much for the system. For if all their claims are just and tenable, then all fodder should be put into the silo, and every available crop, including apples, squashes, roots, and every grain and grass, would be improved by this process of partial decomposition.

Some claim that it is analogous to the art of canning fruit and vegetables for human consumption and as successful, and that in ensilage they are providing a canned fodder for their cattle.

If this comparison were true the silo and its products would be all and more than any one has claimed for them. But from the chemical analysis of ensilage and the strenuous opposition which many breeders offer against adopting it because of that analysis, and also because of ill effects observed from its use, it is considered to be a very defective fodder for the butter or milk dairy when fed in any considerable quantity.

According to analyses made at the Connecticut Experiment Station, 1882, the best sample ever offered contained acetic acid and alcohol equivalent to "a quart of strong vinegar" and a pint of rum for each hundred pounds of ensilage. In the United States Agricultural Report for 1882 it is stated that "the acidity and alcoholic nature of the ensilage has been of universal remark, and, to a certain extent, of exaggeration." In the sample from C. H. Roberts, of Poughkeepsie, N. Y., the conditions had been such as to make the alcoholic fermentation most prominent, but even under these circumstances alcohol was only recognized in the distillate from the juice by the iodoform test. The juice expressed from the specimen amounted to forty and a half per cent. of the substance taken. The following determinations were made:

Specific gravity, 15° C	1.0335
Total solids	8.14
Glucose	.94
Sucrose	.13
Total acid as acetic	2.71
Total acid as lactic	3.08

This sample may be regarded as an extreme of acidity, owing to its having been out of the silo two days before examination. As it requires one tenth of a pound of acetic acid to make one quart of the *strongest vinegar*, one hundred pounds of this ensilage would contain twenty-seven quarts of the very harshest vinegar, beside

the three pounds of lactic acid. A specimen from Alexandria, Va., contained acid equivalent to twenty-one quarts of sharp vinegar to the hundred pounds.

It is the vinegar and alcohol, and other products of fermentation, that render ensilage unacceptable as a food for winter soiling. If these products could be avoided or prevented, then winter soiling would be as successful as the summer soiling for dairy cattle. If acetic acid, lactic acid, butyric acid and alcohol in great or small amounts improve the fodder, as some claim, why, then the whole world will have the benefit of it as soon as it can become generally adopted. It is a matter of great consequence to breeders of thoroughbred Jerseys that they adopt nothing that shall hinder the progress of successful breeding and dairying.

Some have boldly risked and lost much in testing the ensilage experiment during recent years, while many of the best breeders and feeders in the Jersey world cannot be induced to try the experiment.

When the silo shall have become as successful in its purpose as the canning of pears or peaches in culinary art all Jersey breeders will adopt ensilage. The feeding is just as important as the breeding. *Prove and hold fast that alone which is best.*

TRAINING HORNS.

One Jersey breeder is very successful in producing cattle of fine form and beautiful colors; another cares little for form, much less for color, but gives his whole attention to filling the churn, while a third is a dabster at training horns.

The horns of a Jersey are ornamental and give a certain character to the animal, varying according to their size, color, shape and texture.

It is best to have Jerseys that breed the true Jersey horn, or at least it is desirable to have something like uniformity in the herd. Some horns crumple, others are tossing, and a few are angular. It is supposed that about one fourth of the Jerseys have horns that either turn inward and downward, or inward and slightly upward, while about three fourths have horns that either flare or assume a nearly vertical direction. It is desirable that they occupy as little space as possible, and also that they be rendered, as far as practicable, harmless from goring. The crumpled form is the best, turning inward and downward.

The process of training should begin at an age before the horn is too hard, usually about one year old.

Bore through the horn half an inch from the tip with a small gimlet. Tie a piece of catgut or a copper wire securely through these holes. With some heifers the weight of the string and its slight pressure may be sufficient; if not, hang a little bag from the centre, having a few birdshot for weight, allowing it to rest upon the forehead of the animal. The weight of the shot must be adjusted to the stiffness of the horn. A young bull might require from half a pound to two pounds, and in rare cases three and four pounds. The process must be watched and the weight

adjusted according to the conditions. If one horn is stiffer than its mate it may be nicked with a file or rubbed with sand-paper on the inner surface; at the same time a daily oiling will hasten somewhat the operation. Too much weight or too violent a strain on the wire or catgut will cause a thickening of the horn at the base. The trainer simply needs to exercise judgment and will soon acquire skill in his work. While the training of horns is progressing the animals should be kept in their stanchions, as that secures them from any damage by entanglement or hooking or colliding with fences.

When the horns have the desired turn remove the apparatus and file off and polish the tips of the horns, so as to obliterate the gimlet-holes.

The work will well repay the care and skill expended by a more attractive appearance. Recent improvements in horn-training apparatus obviate the necessity of boring the horn, a button being adjusted to the tip of the horn as a support to the tension and weights.

CARE OF THE BULL.

The bull is "half the herd," and if in himself he is worthy of the place he occupies, must command the most skilful care and attention to preserve his potency and keep him in condition for the transmission of his best qualities to all his progeny. The bull is the breed, and transmits his race characteristics and individual qualities in a greater degree than the female. It is important that he should be kept in a uniformly healthful condition by proper exercise and feeding, and in no case allowed to impair his potency by any excess or too frequent use.

The best bull must possess a vast amount of latent energy and neural force, and consequently should be of a very lively disposition. He therefore needs much exercise in the open air and sunlight and kind treatment, or he may become surly and fierce. He should be nimble in his movements and never lazy, high-spirited and never dull, always ready to respond when properly called upon for service, and unfailing in every effort, provided that the cow is in good health.

He must be kept in a lean and active condition, and yet be well nourished. If he becomes fat impotency will follow. His first service may be at about the age of fifteen months, and may be repeated monthly until he is two years of age. From two to three years old he may give a service bi-monthly, and after three years of age one weekly service is enough to require, if offspring possessing the requisite neural energy is to be secured. The service might be less frequent to the advantage of the progeny, male or female; and in service the bull should never be allowed to repeat his efforts after one successful copulation, but always removed immediately to his own stall. Nothing is worse than repeated copulations at one interview, or on the same day, for destroying the potency of the male or for tending to produce degenerate offspring. The best progeny must always be procreated when the male is in perfect vigor. One

service supplies a superabundance of the sperm cells; a second is less likely to hold, and may be of inferior vital quality.

The question is not how much, but how good service.

BULL EXERCISE.

The bull should have a variety of exercise. The running of an empty tread power at a low rate of speed for one hour or even a half hour each day is of great benefit. He should not be compelled to follow too long. In pleasant weather he may be turned into an open field that is guarded by a barbed wire fence. The bull pays a profound respect to barbed wire. It is a good plan to tether him in a pasture a few hours each day, as advised in chapter on Pasturing, using a strong iron post, which may be driven into the ground to the depth of two feet or more. On the top of this post a sliding ring and swivel admit of the requisite freedom of movement. To this ring is attached a chain, which may be about twenty-five feet long, and composed of steel in fine links, of which a sufficient part are swivelled to prevent kinking while the bull walks. Such a tether gives a circuit of one hundred and fifty feet. The fastenings must be secured by a steel spring or clasp, which may be passed upward through the nose-ring, and secured to the steel ring in his head-stall, that is firmly buckled about the base of the horns.

RINGING THE BULL.

The ring ought to be of the best quality of steel, or of pure copper, and of a size having an outside diameter of two and one half inches.

It is well to apply it when the animal is about one year old, or during the time of his horn-training.

To perform the operation, be provided with the trocar and canule and a ring of the right quality. Secure the bull in the stanchion of his stall, or turn his head and secure him firmly to the post by a strong halter. Grasp the cartilage of the nose and carefully select the point for insertion, which must be as high as possible, so that the ring shall be out of the way of liability to catch upon snags or nails, and also to guard against its tearing out, as may occur in powerful bulls when set too low. Take a good hold upon the nasal cartilage, pass the canule, with the trocar point slightly projecting through the cartilage, let the open ring follow the canule through the incision, clasp it, and insert the screw, turning it down firmly in its place.

For leading, a short steel chain may be attached to the staff hook, always well secured to both hook and ring by a strong lock snap.

The staff needs to be of the finest quality of straight-grained, thoroughly seasoned, well-tested timber.

Care must be observed in the operation of ringing that the trocar and canule are of the best pattern and quality and the trocar always kept sharp and smooth, as a

rough or dirty instrument may cause blood-poisoning or other mischief by a ragged incision.

KIND TREATMENT OF THE BULL.

The bull is as susceptible to kind treatment and petting as any other animal, and he resents cruel treatment, oftentimes with the traditional persistency of a bear or the revengefulness of a savage. Instances are recorded where a bull, having been beaten or abused in his stall by a stranger, always entertained a hatred for the person, and knew his step so well that whenever he came within hearing, although he could not see him, he would manifest his displeasure in the most unmistakable manner.

Always treat a bull kindly and manage him with firmness and caution. Never presume upon his friendship, for he sometimes takes a sudden freak of playfulness or a passion for combativeness, and in either case wishes to try the force of his neck, head and horns. Treat him as a pet, and at the same time let him very early be taught to recognize you as his master and to yield implicit obedience to your will and your commands. The bull is inclined to resent a club—at least he cannot be beaten back with a club if he is determined—but he pays respect to the tingling of a tough switch or whip when applied to his muzzle. If early trained he dreads the whip, and pays it as much respect as he does a barbed wire fence that is properly constructed, for that is a barrier he doesn't care to fight against, even under the extremest provocation of the charms of a matable heifer on the opposite side of the fence.

Treat the bull kindly and compel kindness from all his attendants, but allow no man to have charge of him who is a poltroon or a coward.

THE HELMET.

If a valuable bull becomes excitable and hard to manage he may be controlled by the Bull Helmet. This may be made of strong leather and formed to cover the forehead and eyes, and secured firmly around the horns, and by a strong throat-latch made to buckle under the cheeks. The eyes are protected from contact by conical-shaped leather goggles, which are firmly fastened in the helmet. This helmet is a complete blinder, and the bull wearing it is subject to his master's hand, and may be led quietly wherever desired. The helmet ought to be used on all bulls above two years old with absolute safety, and might have saved many a valuable bull from slaughter, as it is the lively fellows that get good stock and transmit neural force to their progeny, and such a bull may remain potent for fifteen years or more if rightly used.

CARE OF BREEDING HEIFERS AND COWS.

The Jersey breeds at an early age.

The heifer should be bred when fifteen months old, as nearly as practicable. Mr. J. W. Vance, Cantrall, Ill., reports heifer dropping calf when eleven months and eighteen days old. It is desirable to have uniformity of size in a herd and to have

Jersey cows of about nine hundred pounds weight, but it is also desirable that they have the characteristic Jersey traits of early development, persistent milking, and cream-producing richness. It seems necessary to breed at the age named to secure and perpetuate these qualities. If bred later they are inclined to lose the Jersey quality and take on fat. If thought desirable, the time of the second calf may be delayed so as to give time for a larger growth of the young cow, but the cow character is to be established as early as the growth and constitution of the animal admit of it. The aptitude for milk production early established, the after-growth and management depend somewhat on the time of the second calf, which it may be well to have timed to the age of three and a quarter or three and a half years, so that the second breeding should be from six to nine months, or even a year from the time of dropping the first calf. The cow should be treated with the utmost gentleness, and the Jersey heifer makes the most attractive pet in the world. Every farm attendant should have the characteristics of a gentleman, and in his mind anything like cruelty or even rudeness to a Jersey cow should be abhorrent, and any person practising such cruelty by a kick or a blow should be banished from the farm at once.

THE PARTURIENT COW.

Two weeks or more before calving the cow should be put in a box-stall where she may have quiet and especial care as to her diet and bedding. The food should be palatable, cooling, and sufficiently laxative to preclude any danger from constipation. The bedding should be sufficient to give her comfort and rest. If the cow is in perfect health she will pass through the ordeal in safety, and afterward, under the right management, give her owner the full benefit of her productive powers in milk and butter.

It may not always be easy to say that a cow is in perfect health, but if she has been properly cared for and had proper feed she will not need any assistance in parturition. Any mechanical interference, unless very skilfully managed, is hazardous, and may destroy the calf and permanently injure the cow. There should always be present a man of experience, who is properly informed in regard to the necessary treatment in case of emergencies, and he should have the good sense to refrain from all unnecessary interference, and yet know how to afford proper aid, either mechanical or medicinal, when such is needful.

The approach of parturition is indicated by the soft and swollen vulva, the fully distended udder, and the day previous a sinking in about the pelvic bones. The cow should now have a quiet stall and no one allowed to come near, except the persons who have charge of her feed and her safety. Her drink must be warm; no cold drinks should be within reach, but pure water 65° or upward, or warm gruels of flaxseed and bran mashes, and cooling, laxative food.

As labor approaches the first stage is ushered in by uneasiness, which gradually

increases. The animal must be screened from view by a curtain, and kept from all annoyance. After a few hours the dilatation of the uterine ring is complete, the contractions become violent, the cow gets up and lies down frequently, the belly becomes lank, the cow utters a slow, frequent moan, the expulsive efforts becoming gradually more forcible, and the breathing is quicker.

The bursting of the sac and the discharge of watery fluid indicate that the labor should terminate reasonably within two or three hours. The efforts now proceed in progressive rapidity, till at length a protrusion of the vulva indicates a near termination of labor. The parts gradually dilate with each expulsive pain, the calf presents at the opening vulva in its natural position, the head stretched forward and resting upon and between the knees ; the labor is progressing naturally ; let the cow alone and keep away any intruders, but be ready to attend to the calf, which in a little while is safely expelled and becomes at once a breathing, independent existence. See that the cow is protected from currents of air.

THE CARE OF THE YOUNG CALF.

Examine the navel-cord to see that it does not bleed. If it bleeds tie it with a ligature of soft thread. Place the calf in front of the dam, that she may lick it. When this natural and beneficial process is completed the calf will after a few attempts rise upon its feet and instinctively search for the udder. Allow it for the first day to suck the dam three or more times, and after each sucking milk the udder empty.

Afterward milk the cow regularly three times a day, and teach the calf to drink as directed in the chapter on Feeding Calves. It is very important that the pails, buckets and feeding-troughs of calves should be kept scrupulously clean by daily rinsing in cold water and scalding in hot water, and a subsequent airing and sun-drying. The calves should be kept in separate pens or stalls, as they annoy each other by sucking. Bull calves should not pasture with heifers at any time, as after three months old they are liable to breed. After ten months old bulls annoy each other and should be kept apart.

Difficulties of parturition will be treated of in another chapter on Casualties.

The afterbirth should be conveyed to the manure-house as soon as it is expelled. Never allow the animal to go through the revolting process of trying to hide it by swallowing.

CARE OF THE CALF AT BIRTH.

In cold, wet, or chilly weather many a young calf is lost, or stunted, for want of the requisite attention during the few hours subsequent to its birth. Have several boxes provided of a size large enough to hold the calf, so that it can lie comfortably at rest. When the birth of a calf is expected have a dozen bricks heating in an oven or furnace. As soon as the calf is born place the bricks evenly over the floor of the

box, cover them with three or four inches of finely-cut straw, placing a blanket over the straw.

Lay the calf upon the blanket and cover with another. Rub the calf dry with a coarse towel. Such care insures against much loss that would otherwise accrue during cold or inclement weather. Calves that were so feeble as to require feeding with a spoon and constant artificial heat to keep them alive have become wonderfully robust animals.

In one case a birth at the seventh month of a choicely-bred calf required such treatment, and the owner was well repaid for his care in the saving of the life of a valuable Jersey bull.

Calves need as much of sunshine as adult animals. The sun must always be admitted freely to their stalls by very large windows, and their exercise should be sufficient to keep them in good health and prevent the accumulation of fat, a condition unallowable in a Jersey of any age, whether bull, cow or calf.

Never allow any animal to be imprisoned in a dark stall.

Teach every animal to lead by halter, from calfhood.

CASUALTIES.

There is no calling without its casualties.

As in all other human occupations, so in the breeding and management of cattle there are accidents, unforeseen, improbable and strange; accidents from negligence or from carelessness; from ignorance or from improvidence; from mistaken kindness; from overfeeding and from medical malpractice or neglect of correct medical practice.

STRANGE CASUALTIES.

A choice Jersey bull died from swallowing a piece of bale wire in cut feed.

A farmer having a herd of choice Jerseys pastured them in a river meadow. On a day when one of the herd stood quietly chewing her cud upon the river bank a passing steamer blew its whistle, at which sound the cow was so suddenly startled that her one impulse from fear caused the bank to cave in, and she was drowned in a depth of two feet of water.

A farmer turned a heifer (not a Jersey) alone into a pasture, and a few days afterward found her with a broken horn which had bled excessively, and for which no treatment that was used caused any check, the animal at last dying from loss of blood. The injury was probably caused while rubbing herself against a rough rail fence or while attempting to get out from loneliness.

The same farmer left a calf (not a Jersey) tied to a stanchion by a rope around its neck, and turned the dam into the adjoining stanchion to give the calf suck. Returning after a little while, what was his astonishment to find the cow quietly

standing in her stall, while her calf, with his rope noose across her back, was hanged by the neck, dead!

How many specific errors can you discover in the management of each of the above cases?

When the cow lay down and the frisky calf jumped over her back he might not have been strangled if he had worn a head-stall instead of a noose; but who would think of allowing a calf to suck when hampered by any kind of a halter?

A famous prize cow in a noted herd was one day missing. Search was made in every field and building. She was a gentle and sagacious creature, and could open any gate or door, and at last in a little colt barn the searchers, peering down a hatchway into the deep, dark cellar, saw the favorite cow, all in a heap, and grieved to think her dead.

They got her out and found her yet breathing, and with good care she soon began to mend, but her fine, shapely rump was broken, and it took nearly a year to heal. Although she was within three months of calving, she carried her calf to full term, and has since had several choice calves, and at sixteen years of age is producing a large quota of butter, with a prospect of several more valuable calves.

A wealthy gentleman, who might be characterized as more wise than prudent, having a large estate and rich farm which he wished to stock with choice cattle, procured at a large expense two young bulls and several heifers.

He desired that the bulls should be kept in vigor by abundant exercise, and concluded to break them at once to the yoke. To make them speedily familiar with this ancient implement of service he turned them, yoked, into a river pasture, to enjoy close companionship in eating and drinking.

The heifers were also turned into a river pasture. It required but brief time to bring disaster upon disaster, which almost wiped out of existence the new young herd. The bulls waded the stream to drink and play, when one of them floundered and was drowned, and his yoke-fellow was but just able to keep his head above water.

The heifers discovered upon the river's brink some freshly painted boats and paint-pots partly filled with paint, and, having a great relish for linseed oil and the aromatic turpentine with the combination of white lead, were soon eagerly engaged in licking off or lapping up the fresh paint.

Result: all that got access to the paint were speedily attacked with intestinal spasms, colic, general convulsions, and paralysis, which soon put an end to life.

Foresight is better than hindsight. Those who attempt to breed and manage herds of cattle should be able as far as possible to foresee and forefend all such accidents, and also many violent diseases.

SULTAN OF ST. SAVIOUR'S 5328.

Sultan Type.

M. H. Messchert, Douglassville, Pa.

SULTANE 2d 11,373.

Sultan Type.

TESTED IN 3 DAYS, 10 LBS. 1 OZ.

M. H. MESSCHERT, DOUGLASSVILLE, PA.

LEAD COLIC FROM PAINT.

Several very choice animals have died from colic by licking fresh paint in their stables, or from barns and fences. A very choice bull, son of the best Jersey cow ever known, was thus destroyed. He could not have been purchased from his owner for any amount of money, and was of more value to the Jersey interest in America than the cost of all the paint on all the barns of the whole country for a century.

THE DEADLY ARSENITES.

The practice of using Paris green to destroy insects is a reprehensible one, in that it not only endangers the lives of valuable animals, but also human lives. The system cannot be too strongly condemned. It should be abated, and other means as effective, but without hazard to life, substituted therefor.

OVERFEEDING.

Indigestion from overfeeding is very common and fatal among calves, while bulls and cows not infrequently die from the evil effects of the same system of injudicious cramming with ill-assorted rations of rich or indigestible foods.

FATTY DEGENERATION.

Many breeds of cattle have suffered much deterioration from habitual overfeeding, perhaps none more than the Short-horn.

It has frequently been noted that a Short-horn bull kept in full flesh or fat enough for the butcher failed to get any calves, but with gradual decrease of ration and gradual increase of exercise, health was restored and potency returned. Barren cows by being worked in the yoke were freed from surplus fat, and became prolific again. Nothing has been so ruinous as overfeeding for fairs. It destroys the milking properties of a breed and induces a disease, *Fatty Degeneration of all the Muscular Tissues.* Many choice Jerseys have been killed by overfeeding for shows and for tests, and much damage has been done by presenting stock at public sales in a pampered and extremely delicate condition. Such cattle suffer deterioration in quality and may require a year in the new owner's hands to recover ; some are never restored to a normal condition of health. The coat becomes dull, the appetite capricious, the milk falls off in quantity and quality, or fails entirely, and the purchaser suffers great loss.

Skilful feeding is needful for health and success.

HOOVE—METEORISM—TYMPANITIS.

The overfeeding of cattle upon succulent food like green clover or the excessively heating maize meal or cottonseed meal, causes very dangerous attacks of

indigestion. The filling up with green foods produces a gastric irritation and a rapid fermentation in the rumen, with enormous distention from food gases, a severe and dangerous affection.

GARGET.

Inflammation of the udder may be caused from improper food, as ensilage, cotton-seed meal, or excess of corn meal, or by incomplete milking or too seldom relieving of the udder; from taking cold in a blast of cold air; from dampness and cold; from wading in cold brooks or ponds; by injury to the udder from briers in the pasture; from bites of animals or stings of insects; from attempting to force dry; from acclimation fever or other illness; and, worst of all, from kicks or blows given by brutal attendants. It often renders one or more quarters of the udder useless. Feed wilted grass, warm bran mash, and linseed gruel.

LIGHTNING.

A spark of electricity passing down a tree in a storm is often sufficient to destroy a herd gathered there for shelter from the rain.

So in a barn unprotected by a rod, a bolt may take in its course the bodies of several cattle, or burn the barn and its stored crops, with the cattle; or a rod unskilfully set may conduct the bolt to the cattle instead of the earth.

Any man is culpably negligent who does not see that his buildings and cattle are properly protected from any stray thunderbolt that chances to come within his dominions.

In a city most buildings are well protected by the great amount of metal in them, especially of waste-pipes, water-pipes, and gas-pipes, but in the country barns and stables are very prone to be struck by lightning, with great loss to farmers. Wire fences also conduct the lightning to cattle lying near them. The greatest losses from lightning occur in the tornado region of the United States.

Rules for Adjusting Lightning-Rods.

BY PROFESSOR J. K. MACOMBER, IOWA AGRICULTURAL COLLEGE.

"1. The best material for the rod is iron. Copper is a better conductor, but more costly.

"2. The size of the rod should not be less than three quarters of an inch for solid round iron. A hollow pipe would do equally well if it contained as much metal. *Rods usually sold are too light.*

"3. Insulators of glass or other material are worse than useless. They increase the expense, weaken the support of the rod, and actually do harm by preventing the induced electricity from being drawn from the building by means of the rod.

"4. The rod should be fastened to the building by staples, and be laid up

against it as closely as possible. No sharp turns should be made by the rod. All turns should be made by smooth, long curves.

"5. *The rod should be continuous throughout.* If too long to be welded into one rod let it be made in four or five sections, with screws cut so that the parts can be put together strongly. The end should be pointed.

"6. Each prominent chimney or gable should have a rod running to it and a point running up from six to eight feet above the building.

"7. *The rod should be well grounded* and also be metallically connected with all masses of metal within or on the building at their highest points. Eave spouts and metallic roofs should be connected by soldering copper straps thereto. *The point most important and generally neglected is the ground connection.* It is the universal custom for those who put up rods to simply drive a bar of iron into the dry earth a few feet, and shove the rod into it, and call that a sufficient ground connection.

"*A rod put up in such a manner is of no value.* A hole should be dug until permanently moist earth is reached; the rod should run down into this and then bend away from the house.

"Several square feet of metal should be placed in this hole and the rod terminate in this metal. An old copper wash-boiler is a good terminal. One hundred feet of three-quarter-inch iron costs $7.50; painting, $1; couplings, $2; labor for one day in erecting, $2. Total, $12.50.

"A fancy tip, or gilded vane or ball, can be added at a small cost."

Large trees in pastures where cattle remain during storms are sources of danger. A single tree of great size in a pasture should have a rod passing well down beneath its roots.

The barbed wire fence should be made safe by a rod at each corner of the field and at each gateway. These rods should also be set deep enough to reach moist earth. The wires should be wound around or soldered to the rods and all stapled to the fence-posts.

LICE UPON CATTLE.

That farmer cannot be called civilized who would allow cattle to become infested with such a pest as lice while in his own stable. If cattle are kept in clean stables, fed upon suitable rations, and have a good brushing once a day, they will not be so afflicted. But if cattle have in any way been subjected to such a nuisance, it should be remedied as quickly as possible. A decoction of Larkspur (*Delphinium staphisagria*) applied daily until all signs of annoyance disappear is a very effective remedy. The tincture of larkspur can be procured at the pharmacies. If of full strength it can be used by mixing one part to nine parts of hot water, and applying at a temperature of about 130°.

Pyrethrum powder, a teaspoonful to a gallon of hot water, is also effective for the same use.

The cattle should be brushed in a room set apart for that purpose, daily. The Universal Joint Brush is very expeditious by the use of steam power or an ordinary tread power. Such brushing and cleanliness are of great benefit to the cattle.

HEALTH AND ITS CONDITIONS.

In perfect health all bovine animals are sprightly in disposition, good feeders, regularly chew the cud with enjoyment, have a normal pulse and respiration, uniform temperature, soft, mellow skin, and glossy hair, void urine at regular intervals, and also moderately soft fecal excretions.

PULSE.

The bovine pulse is naturally full, soft and rolling to the finger-touch. In disease it may become more frequent or slower; it may have a sharper stroke or a lagging impulse; it may be full and strong, or weak, small and thread-like; hard or soft, oppressed, jerking, intermittent, unequal and thrilling.

The pulse may be felt on the border of the lower jaw; beneath the bony ridge which extends upward from the eye; *over the middle of the first rib or under the tail.*

In adult animals, while lying at rest, the number of beats per minute vary from thirty-eight to forty-two. But after a full feed and in a high temperature the pulse may be excited to sixty or seventy. In young animals it is much more rapid, while in old age it may lessen by five or more beats. Small animals have a faster pulse than larger of the same breed.

The pulse is increased by fear, exertion, nervous exaltation, by pregnancy, in hot, foul air, and by overfeeding. Aside from these conditions, a rapid pulse indicates either fever, debility or some inflammatory action.

The unequal and irregular pulse may indicate a fatty degeneration of the heart and other organs, or dilatation of the heart, or some disease of the heart-valves of the left side of that organ.

The intermittent pulse may indicate merely a disturbance of the heart's action through some disorder of the system; it sometimes accompanies organic disease of the heart.

The jerking pulse indicates disease of the valves at the left side of the heart, and is usually accompanied by a hissing or sighing murmur with the second heart-sound, heard by placing the ear as near to the region of the great vessels as possible.

The action of the heart may be detected by applying the palm of the hand behind the left elbow.

By frequent practice one may learn to detect the slightest variation from a healthy standard, and apply the sanitary and medicinal remedies as needed.

RESPIRATION.

There should be nine or ten full respirations each minute. The nostrils, dilating easily and regularly, admit the air to the larynx, trachea and bronchi, a complex, flexible, and elastic apparatus, retaining a tubular form, and conveying an ample supply of air to the two large, spongy, elastic bodies called lungs, which occupy the right and left portions of the thorax. The lungs are about one-thirtieth of the weight of the body, and are for the absorption of oxygen and expulsion of carbonic acid and other impurities, or the transformation of vitiated or venous blood into bright red arterial blood.

The process of maintaining animal heat is carried on in the minute vessels called capillaries, where the waste of the tissue cells is oxygenated or burned in the processes of repair, and it is in the cells and capillaries of the body that animal heat is produced. The normal bovine temperature does not vary much from 101½°.

ACCLIMATION OF JERSEYS.

If Jerseys are taken into the Southern or Gulf States from the Northern States and Canada, they must necessarily suffer, according to the change of conditions of climate and soil, for some months, during the process of acclimation, a degree of disturbance sometimes rising to quite a high febrile reaction.

It is best to bring animals into the South in the autumn and always locate them, if possible, during the first year upon high lands. The higher and drier the land, the nearer will their condition approximate to that from which they came. Those breeders living upon high and elevated districts are best situated for the importation of Jerseys either from the Island of Jersey or the Northern States and Canada.

It is also advisable to select young animals, from six to twenty months old, as they endure the change better than adult animals or very young calves.

ACCLIMATION FEVER.

Acclimation fever is a term applied to the very marked disturbance of the system caused by a change of climate. Jersey cattle are as easily acclimated, perhaps, as any bovine race.

They thrive with wonderful vigor in Canada and are fast becoming favorites in our Southern States and California. Acclimation fever is most violent at low altitudes in hot weather. Cattle improve when taken from low hot districts to mountain altitudes.

ABORTION (SLINKING).

Abortion is the worst of all the casualties that affect the Jersey breeder, because, if not properly understood and guarded against, he is liable to suffer the greatest loss and disappointment from this dire disaster.

Abortion is the separation and expulsion of the immature ovum from the womb. It may occur at any time between fecundation and the time of normal fulfilment of utero-gestation.

During the first month it is called ovular abortion; from the first to the third month it is called embryonic abortion; from the third to the sixth month it is called fœtal abortion; from the sixth to the ninth month premature birth.

This casualty is mentioned in the oldest literature of the world which we possess. Moses in the book of Genesis makes Jacob allude to the subject in his last interview with Laban. Speaking of the prosperity of the flocks and herds under his care, he mentions that they had been exempt from this scourge during his long sojourn of twenty years, and attributes this security to the favor of Almighty God. Moses in the book of Job, where he utters his complaint in his terrible affliction and makes allusion to the unaccountable prosperity of the wicked, says, "Their bull gendereth and faileth not, their cow calveth and casteth not her calf." From this it would appear that abortion is not a new thing, but was an old-time calamity among the bovine races.

Abortion is very frequent in all breeds of cows, and not more common among Jerseys than among scrubs. It is an evil the more to be dreaded by the Jersey breeder as, besides the loss of a valuable calf, it sometimes occasions also the loss of the dam, or renders her barren by some uterine injury, or subject to repeated abortions.

The causes of abortion are very various, such as: bodily injury by sharp goring; kicks or blows from cruel attendants; fast driving, or running to and from pasture; plunging or jumping down embankments; injury by transportation in carts and rail-cars; from violent efforts at riding with rutting animals; from fright by thunder and lightning, barking dogs and wild animals or any startling sight; from the nervous excitement caused by company of aborting cows; from pasturing with horses; from electric shock by proximity of lightning-stroke; from foul air of non-ventilated stables; from "malaria" or swamp air; from pungent or offensive odors, such as carbolic acid or chlorine gas; from sour, fermented food, as brewers' grains, apple pomace, distillery slump and ensilage; from excess of laxative food; from insufficient or poor quality of food; from excessively rich or stimulating food, as cottonseed meal; from impure water; from mineral waters; from insufficient exercise; from standing on sloping floor; from confinement in dark stables; from lonesomeness; from "acclimation fever"; from many acute diseases;

from poisoning by "smut" of Poa grass, corn smut (*Ustilago maydis*), rye spur (*Secale cornutum*), and other fungous growths; from other poisonous plants; from the malpractice of using cathartics, salts and various nostrums; by contagion from impure vaginal discharges; from being forced dry; and from a specific infection which may be communicated from herd to herd by the transportation of animals out of infected herds to healthy herds. This contagion is so virulent that every member of the largest herd may become infected from one animal.

SYMPTOMS OF THREATENED ABORTION.

Sometimes the symptoms are so slight as to be unobserved previous to the culmination of the disaster, especially before the third month; but in general it is announced by great disturbance of the system, anxious look, depression, sudden diminution of the milk, and by offensive mucous vaginal discharge. It may occur at any period of pregnancy, but especially about the twentieth week, and from that to the thirty-second week. The approach of abortion will be noticeable in the languid gait of the animal, the less active movements of the fetal calf, the diminished appetite, the loss of the cud, the lank, drooping belly, irregular breathing, a yellowish or bloody discharge from the vulva, an irregular or feeble pulse, a springing of the bag and increase of milk.

Always isolate a cow at the first symptoms and give her a separate attendant.

COLOSTRUM APOPLEXY.—MILK FEVER.

These are names applied to one of the most fatal of maladies affecting the cow. The best cows are liable to be destroyed by it within three days from calving. Cows seldom have it with the first calf. Very poor milkers never have it. The danger increases in great milkers as they attain the period of their greatest productiveness, usually from seven to ten years of age.

An excess of fat upon the internal organs and the habit of constipation are conditions which strongly predispose the cow to a fatal attack.

Within twenty-four hours after calving the cow may suddenly fall without any premonitory symptoms having attracted the attention, and, remaining unconscious and unable to swallow, dies in a few hours.

The cases vary much in the severity of the onset, but very few recover spontaneously.

Many show a condition of languor or great depression, cease to chew the cud, and lose all relish for food, and hang the head with a dull expression of countenance; the muzzle is dry and hot, the horns also hot, the bowels constipated, the urine scanty or suppressed, the pulse fast, and the breathing rapid, with heaving flanks, the milk diminished or checked altogether, the temperature high. If these symptoms

are not soon remedied the cow gets rapidly worse. The eyes glisten and become congested, and the white is of a leaden color streaked with the red blood-vessels. The eyes protrude from their sockets, the cow is uneasy, the legs are weak, she continually changes her position, the hind legs become tremulous and can scarcely support her. The discharge (lochia) from the vulva ceases, the pulse becomes slower and the breathing more and more labored; the udder is hard and swollen; the weakness in the hind legs increases, the feet are spread wide apart; she staggers and falls heavily upon the floor, then, struggling to recover herself, is unable to rise. In this condition she tosses and writhes, with lashing of the tail and frequent moaning or bellowing, seems in the greatest distress, the breathing becomes a labored panting, the body is covered with a cold sweat, and the rumen is enormously distended with gas, which more and more increases the difficulty of breathing. The pulse flags, the legs become cold, the cow belches a fetid gas, and life is extinguished.

In other cases the cow may lie stretched upon her side, with the head turned looking backward and resting upon the floor, or the head is thrown upward and backward in a rigid position with the horns pointing over the shoulders, the eyes are glassy and sightless, the pupil widely dilated, the ears limp, the jaw drooping, and the cow scarcely able to swallow and fast losing all sense of touch; the pulse is scarcely perceptible or intermits, the horns, legs and skin become cold, the breath rattles, the belly distends, the udder is swollen and sometimes red, the dung and urine suppressed. The cow dies within two days, often in a few hours. The pathology of this disease is not yet fully understood. It is not yet decided whether it is a disease of debility or of congestion of the brain, or whether it may not be complicated with meningitis. It seems to be the result of the profound disturbance caused by the sudden effort of the system to transform a large part of its tissues into milk. It is remarkable also that the disease occurs only during the colostrum stage, while the milk is yet incomplete, and while the disruption of membrane from the follicles of the udder glands is one of the results of the intense and mighty change, prior to the normal shedding of milk globules and the well-established flow of perfect milk.

Probably in all cases of colostrum apoplexy there is a check of perspiration following labor—in other words, "taking cold."

By a reference to the analysis of colostrum * given below, and comparison of its elements with those of milk analysis in another part of this volume, it does not require very profound reasoning to determine that the organism of the cow, during the week of the *colostrum stage*, endures a great physiological change, which requires but a slight disturbance to become a serious one, bordering on fatally diseased conditions.

* First Annual Report N. Y. State Experiment Station, 1882.

According to the amount and richness of the colostrum is the degree of nervous vital expenditure and the danger of a violent irregular circulation of the blood. Consequently the feed and all the sanitary conditions should be regulated for one month before and after parturition with a view to the preservation of a normal action of the whole system.

COLOSTRUM ANALYSIS.*

"Meg, a Jersey cow, calved December 4th. The colostrum was orange yellow, of acid reaction. Specific gravity by weight, 1063. It coagulated into a solid mass by boiling.

Fat	5.22
Casein	7.87
Albumen	7.81
Milk sugar	2.94
Ash	1.23
Loss, etc	.21
Total solids	25.28
Water	74.72
Per cent. nitrogen by combustion, 2.35	100.00"

GENERAL SUMMARY OF CAUSES OF ACCIDENTS AND DISEASES.

1. Diseases of the bowels and kidneys ordinarily proceed from improper feeding and watering or bad forage.

2. Diseases of the chest from insufficient or improper ventilation, overcrowding, neglect and exposure.

3. Abortion from carelessness of attendants, blows, abuse, or eating smut of grass or maize.

4. Diseases of the skin from want of cleanliness, and sometimes from using barley straw for bedding. Some skin diseases are contagious.

5. Wounds and broken horns usually arise from carelessness of management. If horns are broken in fighting it is often by the introduction of a stranger into the herd. The Jersey horn is fragile, so that special care is needed to guard against an accident that mars the beauty so greatly and gives the animal the appearance of a cripple.

6. Garget and foul foot are often caused by wet yards, muddy pastures, or wading in brooks.

It is best to forefend all such accidents, even including "milk fever," by being

* Report N. Y. State Experiment Station, 1882.

well guarded at all times against any form of neglect or carelessness in the routine of management.

TREATMENT OF DISEASES AND SERIOUS CASUALTIES.

"By medicine life may be prolonged,
Yet death will seize the doctor, too."—*Shakespeare.*

An ounce of prevention is worth vastly more than a pound of cure, but when all the precautions of wise forethought and good judgment and well-trained sanitary skill have failed to ward off a much-dreaded malady, then is the opportunity to test the potency of scientific medical skill. The readiness to practice is almost universal, but the skill is much more of a rarity.

Let any man or animal fall a victim to any disease, and every casual visitor of the multitude has a prescription to offer to thrust upon the patient. Everybody likes to doctor except the skilful physician; he holds back until called upon and urged to give advice, which with true modesty and many misgivings he humbly proffers. The world is advancing in civilization, and of all the discoveries of modern times the most beneficent has been that of the great German physician Hahnemann, whose law of cure with its small dose has revolutionized the practice of medicine. But all people have not yet availed themselves of the mild beneficence of scientific medicine. Hahnemann's discovery consisted: First, in finding a universal law for the selection of cures; second, in noting the wonderful susceptibility of the diseased organism to the effects of minute doses; third, a system of preparing medicines so that they may be taken in doses of any degree of division or attenuation desired.

The law for the selection of cures always takes the drug that has the greatest affinity for the organ or organs diseased, and is capable of producing a similar disturbance in the healthy organism. Similars to cure similars. This law will doubtless be demonstrated in the future as an electrical affinity. The small dose avoids aggravation or poisonous effects, but induces a speedy and wonderful reaction. Neither Hahnemann nor any of his followers have been able to ascertain a limit to the curative powers of a drug by any degree of attenuation, and no man is able to say of any drug properly selected that a dose of any degree of limitation ceases to have curative power by reason of its smallness, nor, on the other hand, that any dose has curative power because of its comparative largeness. In other words, the curative power of a drug lies in its *quality* rather than in its quantity. It is not the purpose of this work to supply a text-book on the practice of Veterinary Medicine, but to offer a few suggestions by which breeders will be enabled to combat, with some degree of success and satisfaction, diseases that have hitherto baffled the skill of the old barbaric system that is happily soon to be among the things of the historic past.

while a happier day awaits those who shall enjoy the advantages of a higher civilization and a better system of medicine.

Those who would have all the necessary equipments for treating the diseases common to all domestic animals must provide their sanitarium with the best text-book extant, Boericke & Tafel's "Homœopathic Veterinary Practice," and a full list of medicines to meet the requirements of all common diseases. There should be the necessary sanitary apparatus, means for heating water, rubber bags for immersing the udder, rubber sheets or blankets to be used in (milk fever) colostrum apoplexy, sponges of various sizes, air thermometers (accurate) to note the temperature of the stable, hot-water thermometers to test the temperature of external applications and drinks, a fever thermometer to note the animal temperature in each case, an elastic syringe for hot-water injections. Hot-water bags may be useful in various diseases; a rubber probang in case of choking; trocar and canula for dropsy and hoven; and a medicator for placing doses upon the tongue.

All breeders who adopt the medical practice herein set forth will be glad that they live in the nineteenth century rather than the ninth. After a faithful following of the principles and doses as given by the great Hahnemann, both for their animals and themselves, they will never desire to return to the barbaric methods which we have inherited as a legacy from the Dark Ages.

PREVENTIVE TREATMENT FOR ABORTION.

Preventive treatment requires one to guard against all the causes which produce this terrible scourge. Strange cows always have to meet the attacks of the fighting or boss cows. Keep them apart, especially if either the stranger or the boss cow is pregnant. A timid cow is sure to be gored; keep her apart from the others.

Transport cattle by steamers when it can be done. Never allow pregnant cows or heifers to be in the company of non-pregnant cows or in the company of aborted cows. Protect animals from lightning as far as possible by good rods on buildings. Never allow any man or boy to make a cow move faster than a moderate walk. A man that runs the cows for fear of getting his shirt wet in a shower may destroy a thousand-dollar calf and permanently injure a valuable cow. Such a man should be discharged from your service at once for any disobedience of orders.

The stables should always be sweet with a perpetual ventilation and perpetual cleanliness. Offensive odors by all means are to be avoided. Fermented foods are a curse in any dairy. The breeding cow should be kept in good health and given wholesome food at all times. All smut plants must be collected if practicable and burned. A field of green meadow grass or other soil infected with this fungus should be plowed and the ground planted to root crops for two years. To prevent fungous growths all pastures ought to be mowed before the grasses mature their seed. Cathartics or drugs for producing artificial diarrhœa and dysentery and other

inflammatory diseases of the digestive organs should not be tolerated in any form; it is mischievous malpractice. All breeders should be cautious about spreading contagion. Those who have abortion in their herds and continue to buy and sell are contributing to spread the disease by every animal that leaves the herd.

The period of incubation after exposure is from three to six months. All cows that abort should be quarantined for from nine to twelve months before being bred again. It is safest to withhold from breeding more than one year rather than less. All strange animals should be quarantined before introducing them to the herd stable at least three months, if there is any uncertainty in regard to their freedom from exposure.

TREATMENT OF THREATENED ABORTION.

Aconite. If the animal has been frightened and the fear remains, or she shows serious after-effects, give a dose or two of the sixth dilution of aconite.

Aletris farinosa. For habitual abortion. Give five drops of the first dilution twice a day during gestation.

Apis mel. Scanty urine with frequent urging to urinate. Constipation. Give sixth or thirtieth dilution.

Arnica. From any mechanical injury, such as goring or any hurt, give ten drops of the first, third or sixth dilution every two hours. Bathe the bruised parts with a lotion of arnica tincture, one part to ten parts of hot water.

Asafœtida. If the cow is very nervously excitable at any time during pregnancy give this remedy daily in the sixth dilution.

Cinchona. Give after abortion to check hemorrhage and to enable the animal to recover from the debility caused by abortion. Ten-drop doses of the first or third dilution.

Helonias. Very important in cases of threatened abortion and for enlarged uterus after abortion or parturition.

Opium. From great disturbance by fright give frequent doses of the thirtieth dilution.

Pulsatilla. If the vulva is swollen and there is an intermittent red flow give the thirtieth dilution every two hours.

Rhus toxicodendron. If the animal is subject to rheumatism or has taken cold in wet weather, subsequent to an injury, give the sixth or thirtieth dilution every four hours.

Ruta. Give to habitual slinkers, in alternation with Sabina.

Sabina. For abortion at the third month. For repeated early abortions, with profuse discharges, use the thirtieth dilution.

Secale cornutum. For thin, scrawny, sickly-looking cows, both before and

after abortion, especially if there is violent straining, profuse flow and feeble pulse. Frequent doses of the thirtieth dilution.

Sepia. This may prove useful in restoring where there is a tendency to frequent abortion, especially with disorders of the mucous membranes. Give doses once a day of the thirtieth dilution.

Sulphur. Give a dose of this remedy in the sixth or thirtieth dilution when the system does not respond to any of the above remedies.

Viburnum opulus is also of great value for abortion and hemorrhage.

Viburnum prunifolium. This is a very useful remedy, and may be given as a preventive of abortion. Give once a day ten drops of the first or third dilution at any stage of pregnancy. Many are in the habit of giving enormous doses of this drug, a dram or more of the fluid extract daily, through the whole period of gestation, but this is inexpedient. Do not make your animals drug-sick with even a mild remedy. Try the efficacy of this remedy if you will in ten-drop doses of the tincture or one-drop doses of the fluid extract, and also the first, third, sixth and thirtieth dilutions. This will prove useful in hemorrhages after abortion.

FORMULA FOR TREATMENT OF ABORTION.

If your cow has aborted prepare one gallon of the Hyposulphite of Mercury solution as directed under Germicides, then scrub the floor with the disinfectant, or saturate the surface of the ground with the solution. If the cow does not clean readily give her ten drops, three times daily, of Pulsatilla, third dilution, mixed with four times its bulk of water.

Use the medicator and inject it upon the tongue if the cow does not drink it in water. The placenta will probably come away early enough without mechanical interference. If the medicine does not bring it away within three days it may be carefully removed by the placenta forceps. When she comes in heat give her a vaginal injection of hot water 130° Fahr. and follow with another of Hydrastis Can., $\frac{1}{2}$ ounce; Listerine, $\frac{1}{8}$ ounce; Water, 8 ounces. Mix. Keep the hind feet elevated, and fill the vagina with the injection from an elastic syringe. When her full time of heat is passed give her another vaginal injection.

Then give her three times daily until her next period, Sabina, third dilution, ten drops of a mixture containing four times its bulk of water. If she comes in heat regularly every twenty-one days you need not delay service with this treatment more than three months, but let it be given as soon as the first symptom is observed. The bull used should not be allowed to serve other than " slinkers."

SPECIAL RULES RELATING TO ABORTION.

1. Remove from the herd at once a cow that shows any symptom of impending abortion.

2. Quarantine all aborted cows and all threatening abortion (the two classes in separate buildings) for one year or until producing a healthy calf.

3. Employ special hands to attend each class of cows, and *quarantine these workmen from the rest of the herd.*

4. Use no quack nostrums in treating such cows, but follow carefully the directions given in this work.

5. If the afterbirth does not come away within three days let a skilful veterinary carefully remove it. If a veterinary cannot be had, the herdsman, if he be intelligent, may be able to do it. The arm and hand being well oiled with vaseline or almond oil, introduce the hand and pass it gently forward to the womb. If the hand, or even two fingers can be introduced within the womb, the adhering substance can be gently separated by pressing the edge of the fingers along the inner wall and by rotating the cord and membranes, remove it without any tearing or wounding of the parts.

BARRENNESS IN COWS.

Barrenness is doubtless most frequent as a sequel of abortion.

Inflammatory action within the uterus or the small tubes which receive and convey the ovules from the ovaries to the uterine cavity may result in producing adhesions of the surfaces of the lining membrane, thereby making obstructions or strictures which prevent either the semen or ovules from entering the organ, so that a union of the male and female germs is impossible.

The only cure for such a condition is effectual dilatation of all the strictures.

Dr. A. D. Newell, of New Brunswick, N. J., has devoted much attention to the study and surgical treatment of barrenness, and has treated several cases successfully.

I quote from an article published by him in the *Jersey Bulletin* of February 15th, 1885 :

" In almost every herd there are one or more cows that their owners fail to get with calf, even after the cow has calved once, and often using various bulls, large and small, usually throwing the blame on the bull. I am of the opinion that it is seldom the fault of the bull, but almost always the relative location of the male germ and ovum in the cow. The male germ must meet the ovum beyond the *os internum* or conception will not take place. I will mention only two of the main causes and opposite conditions of the *cervix uteri*, *os tincæ* and *os internum* that I find prevent conception. There are other minor causes. Conception cannot take place if either of these two conditions exist. One is where the *cervix uteri* is patulous or relaxed and lets out the male germ and ovum before it makes vital connection with the internal mucous membrane of the womb. The other is where the *os tincæ* or the *os internum* is closed, or so small as not to admit the male germ to the womb easily, and thus cannot reach the ovum to impregnate it in the womb. The usual length of the cervix of a cow is about one and a half inches. In a post-mortem examina-

tion of a cow killed for beef I found the *cervix uteri* full five inches long from *os tincæ* to *os internum*, a very unusual length. I have found quite a number that measure three and four inches, and with the *os internum* completely closed, some with *os internum* open and *os tincæ* closed. This great distance of *cervix uteri* to *os internum*, and its firm closure, with open *os tincæ*, has deceived me, and no doubt others, the *os tincæ* often being easily opened with the finger, and the extra depth of the *cervix* causing the operator to think he was through both *sphincters* and into the womb.

TREATMENT OF CLOSURE OF THE OS TINCÆ AND OS INTERNUM.

"Extract of belladonna will relax the *cervix uteri* when the tube is pervious, but no medicine will open the internal *os* when closed by a cicatrix caused by abortion or the rupture and tear of the mucous membrane near the *os internum* at natural calving.

"The whole mucous membrane that lines the womb is thrown off every time a cow aborts or calves, except just at the internal neck. I believe this torn condition of the membrane and its healing causes this cicatrix and closure.

"The canal to the womb must be opened by mechanical means. The parts are of a very delicate structure, and this must be done by very gradual easy dilators and a day or two before the cow comes into heat.

"I have not been able to find any dilators or sponge tents that will answer the purpose fully. The sponge tents were too soft, and gave before they could be got inside.

"The instrument had to be used with one hand, and that in the vagina, and so could not handle the instrument and at the same time keep the finger at the *os tincæ*, and thus prevent the instrument from catching into the folds and fossæ, and could not use gradual continuous pressure, and was uncertain when the canal was tortuous.

"To overcome these defects I made a metallic bougie two feet long, the end of flexible metal that could be bent to any sweep by the end of the right forefinger acting as a live guide to the *os tincæ*. With an arrangement at the end out of the vagina I can make the flexible point sweep to any course, and at the same time keep up a steady, continuous pressure at the obstructions.

"Some points are made of soft material, strengthened by internal broken joints that adjust themselves to any course by a simple rotation, so that there is no danger of wounding the canal. As soon as the canal is pervious I introduce sponge tents to make the canal larger and remain open.

"These tents should be made of tough sponge well saturated with gum-arabic and bound tight over a steel knitting-needle, to be removed when dry.

"Many of the worst cases of barren cows can be made to breed."

The above-mentioned instruments, consisting of a soft metal stylet, and a hollow

flexible bougie, the doctor kindly sent to me for inspection. In the hands of a skilful operator and with the use of properly prepared sponge tents, doubtless many barren cows could be made to breed. But not until we have colleges which will develop the genius for surgical skill that lies dormant in possible veterinary surgeons, and a new order of surgical instrument-makers has been trained, can we look for many cures of these internal deformities. Under the best conditions, with trained surgeons, ingenious devices, rare instruments, and consummate skill in applying them, it may be possible that bovine uterine surgery will yet become a popular art.

In all cases of barrenness arising from functional derangement the cure must be sought by either sanitary or medicinal treatment, or both.

If all the conditions of healthful air, feed, exercise, warmth, dryness and sunlight are secured, and it is found that there is no stricture in the uterus or Fallopian ducts, the breeder must resort to medicines.

We have much to learn in this department of medication, but will offer to suggest a few remedies for investigation.

Aletris farinosa; Damiana; Lachesis; Pulsatilla; Ruta graveolens; Sabina; Secale cornutum; Sepia; Ustilago maydis; Viburnum opulus; Viburnum prunifolium, and Xanthoxylum.

Use only one remedy at a time. Give Aletris, Damiana and the Viburnums in the mother tincture, from one to three drops daily, as uterine stimulants.

Give Xanthoxylum where the animal does not come into heat, using five drops of the *first* or third dilution.

Give Sabina, 30, where you suspect abortion in the first to the third month.

Give Secale, 30, and Ustilago, 30, in lean, scrawny, sickly animals.

Give Ruta, 30, in all cases where you suspect a tendency to a persistent habit of abortion.

Give Lachesis, 30, and Sepia, 30, for fetid vaginal discharges or suspected diseases of the mucous membranes. Always mix the medicine in a little water, and insert it in the mouth of the cow by the injector, if she will not drink water.

A cow that is barren from an enormous accumulation of fat may perchance become fruitful by reducing her to the condition of flesh requisite in a milking animal. This may be accomplished by abundant exercise and suitable feeding with hay and straw.

PROLAPSUS UTERI—EXTRUSION OF THE WOMB.

This is a displacement which is sometimes very troublesome, and unless properly treated may cause the death of the animal or become a chronic ailment.

It most frequently occurs in an aggravated form in those cows having a badly formed rump. The ligaments of the uterus, from various causes, become relaxed or stretched, the vagina loses its elasticity, and the uterus during gestation almost

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protrudes from the vulva. Parturition may be passed safely and the uterus completely extruded within a few hours afterward.

The uterus should always be immediately returned by a hand and arm well anointed with vaseline and pressed forward to its place.

The cow should stand with the hips elevated. Hot-water injections at 130° should be given once a day, cleaning out the vagina, while the discharge lasts. Several quarts may be used each time.

The cow should receive internal medical treatment for several months, and ought not to be admitted to service again within nine months.

REMEDIES.

Calc. carb. For general flabbiness and relaxed condition. One dose daily of the thirtieth dilution.

Conium maculatum. Chronic enlargement and hardening of the womb.

Helonias dioica. A very important remedy for chronic *prolapsus uteri*, with enlarged uterus. Give the thirtieth dilution, a dose of ten drops once a day.

Nux vomica. Constipation, or alternate diarrhœa and constipation accompanying the conditions. Use, as above, the thirtieth dilution, to give tone to the uterus.

Tabacum. Excessive relaxation of the whole system; it seems impossible to keep the organs in place. Use one dose daily of the thirtieth dilution, and apply a bandage or truss if necessary.

Viburnum prun. Chronic hemorrhage from womb.

HÆMATURIA—REDWATER—BLACKWATER.

Bloody urine is common among cattle in certain localities where the land is wet and the pasture poor, and is especially prevalent in rainy seasons with animals that are badly nourished. It is characterized by an impoverished condition of the system.

The disease may also be caused by eating many plants that have an inflammatory action upon the kidneys and bladder.

Oftentimes inflammatory action with this condition of urine may result from a mechanical injury, by sprain or by blows, or various other causes.

Acute Redwater is always an inflammatory condition of the kidneys resulting from one of the above-named causes.

Chronic Redwater, a still more common disease, is characterized by inflammation of the kidneys, and is more difficult to remedy.

Acute Redwater may result from injury or neglect during calving, or bad results following delivery.

It occurs rarely on well-drained lands with well-fed cattle.

SYMPTOMS OF ACUTE REDWATER.

Fever; rapid breathing; cold ears, feet and legs; dry, hot muzzle; tenderness over loins; loss of appetite and cud; bent back; straining to discharge urine, which is very scanty or bloody.

There is at first a bloody diarrhœa or dysentery, afterward obstinate constipation of the bowels and pure bloody discharge from the bladder, which gradually becomes darker or quite black, and may become fetid because of gangrene of the parts.

SYMPTOMS OF CHRONIC REDWATER.

Jaundice; languor; collapsed belly; animals want to be alone; the ears are cold and drooping; eye turgid and yellow; quick pulse; diarrhœa, followed by constipation; emaciation; urine at first yellow-brown, then red, dark brown, and finally black; the discharge is by a fine stream, but copious, with or without straining; milk brown-yellow and lessened, with bad flavor. Sudden remissions and recurrences may continue for months.

TREATMENT.

Remove the animal to dry, comfortable quarters, and give good rations, accompanied with linseed gruel, three times daily.

Arsenicum. In advanced stages with fetid diarrhœa.

Camphor. For chilliness and prostration give drop doses of the third dilution every hour.

Cannabis sativa. For bright, bloody discharges of urine use drop doses of the third dilution every hour.

Cantharis. Terrible straining, with bloody urine.

Terebinth. Bloody urine. Third dilution, one drop every two hours.

TREATMENT OF DIFFICULT PARTURITION.

The too-long-continued pains, the convulsive violence of the efforts, the straining after delivery, excessive hemorrhage, and any other irregularities call for medical treatment.

Pulsatilla. When the pains are slow in developing, or there is fear of a mal-presentation in the first stage of parturition, give ten-drop doses of the third, sixth or thirtieth dilution every hour to facilitate delivery. It is always safe and often greatly aids delivery.

Chamomilla. If the animal is irritable because of the pains and the labor is very slow, give, after Pulsatilla, a dose of the thirtieth dilution.

Opium. If the pains are very sluggish or cease for very long intervals give the sixth dilution.

Viburnum prunifolium. For lack of tone in the uterus, or for excessive hemorrhage resulting therefrom, give five-drop doses of the tincture every three hours.

Viburnum opulus. This may be preferred by many to the above.

Secale cornut. The pains are accompanied with excessive straining. Or the pains are intense with straining after the placenta has been several hours delivered (after-pains). Give doses of the thirtieth dilution after each pain.

Pulsatilla and **Secale** in the thirtieth dilution promote delivery of the afterbirth. Any serious delay in the delivery of the calf or of the placenta requires manual interference, which should be given with the utmost care and gentleness. If the womb is inverted or extruded from the vulva it should be very gently returned with a well-oiled hand. The cow should be kept standing for many hours or a supporting bandage applied. Doses of arnica should be always administered after parturition, ten drops of the third dilution every three hours, and if the vulva has been bruised or lacerated lotions of arnica should be applied to the parts. Sixteen parts of hot water to one part arnica tincture.

Helonias. This remedy should follow arnica for extrusion or falling of the womb. Use the third or sixth dilution.

COLOSTRUM APOPLEXY—"MILK FEVER."

If the cow has been properly fed and not too fat, and the digestive organs are in full health and free from constipation and flatulence, and care is given to protect from taking cold, she is not liable to colostrum fever or apoplexy.

Watch the pulse by placing the finger on the temporal artery near the outer angle of the eye, or by applying the hand to the left side of the chest beneath and behind the elbow. The normal pulse of the cow may vary from thirty-five to forty-two beats a minute. If the pulse rises rapidly to fifty or sixty beats there is much constitutional disturbance; if it rises to ninety or one hundred beats the case indicates peril. Apply the fever thermometer to the rectum; if the temperature is $101\frac{4}{5}°$ or $102°$ there is no danger, but if it suddenly rises, and the rise is progressive, the danger increases with each degree and fraction of a degree. The udder should be relieved of its colostrum after the calf has sucked, by a thorough stripping.

HOT-WATER TREATMENT.

If the udder is hard and swollen it should be immersed in a bag containing hot water at a temperature of 125°. Hot water should be applied to the crown and nape of the neck and the spine by saturated sponges or cloths at a temperature of 140° or as hot as can be used.

DRY CALORIC TREATMENT.

The following is communicated for this work by Mr. F. Loeser, New York, who translated it from the German :

"The Hanover *Agricultural Gazette* contains the following article regarding the treatment of milk fever from Mr. von Rhedn :

"'A few days ago, in one of my stables one of my best cows was taken with milk fever, a violent and apparently hopeless case. I called veterinary Meinberg Grönau. He ordered treatment used by a veterinary with success in Baden, and published in the *Veterinary Journal.*

"'The cow was covered with a woollen blanket, and a common smoothing-iron heated very hot was passed along the spine, and repeated continuously at the highest degree of heat, from 10 A.M. until 8 P.M., when the cow arose and commenced to eat.

"'During the night, in spite of the constant use of the iron, a relapse occurred, but the persistent use of the treatment was successful in the recovery of the cow.

"'The success is explained by the supposition that there is a collection of fluid along the spine, and that this excess of fluid is dissipated by the heat. The woollen blanket is essential to protect the cow from injury. Veterinary Grönau treated four cases successfully. The Baden veterinary claims a recovery of three fourths of all cases thus treated.'"

MEDICAL TREATMENT.

Aconite. If the cow is an extraordinary milker watch her closely ; if she refuses food, the horns become hot, the muzzle dry and hot, and the pulse increases, continue to apply the hot water to the head and the udder, and give *Aconite* every fifteen minutes, five drops of the sixth dilution.

Ammonium causticum. If the rumen becomes distended and the breathing difficult, the pulse weakens, and the cow seems in pain, give this remedy, ten drops every fifteen minutes until the swelling subsides. Use the first watery dilution.

Belladonna. If the cow seems wild or furious and the pupils dilate give ten drops of the sixth dilution every fifteen minutes.

Gelsemium. If the pupils are widely dilated, so that the animal cannot see, and the eyes are bloodshot, give every ten minutes a dose of the third dilution. The medicine is to be administered in a spoonful of water without elevating the cow's head too high, for fear of strangling.

Arsenicum. In the drowsy stage ; insensible to pain ; glassy eyes ; open mouth ; inability to hold up the head. Give a dose of the thirtieth dilution every fifteen minutes. In all cases if decided improvement follows a dose lengthen the time of administering medicines.

Rhus toxicodendron. For a total suppression of the lochia, or discharge from vulva, or for signs of paralysis of back and legs, give frequent doses of the sixth or thirtieth of this valuable remedy. It should restore the discharge in a little while. If the discharge afterward lasts too long, and becomes offensive and ichorous, or bloody, give the Rhus again.

Nux vomica. If the fever has subsided, and the cow lies comparatively at ease, but with loss of muscular power, give a dose of the sixth dilution in water every four hours.

SPECIAL DIRECTIONS.

The cow should be treated in a well-bedded box-stall, with abundance of fresh air of the right temperature. If in the first stages the fever and temperature threaten to reach a high figure the cow should be enveloped in a rubber blanket and wet with water at 102°, or the normal temperature, while water at 140° is applied to the head and also to the udder.

All excretions should be removed at once.

The temperature of the stable should be kept at about 65°.

The udder should be milked out every four hours.

If the cow cannot pass urine the catheter must be used every six hours.

Her head should be supported with bundles of clean straw.

In no case should she be allowed to get cast or to lie extended with the legs stretched out; but she should be placed in such position as to favor easy respiration.

The water if used as directed at the right temperature will greatly assist in allaying congestion, restoring a normal circulation, and abating the fever. Especially excellent is the application of hot water to the head and neck in conjunction with such remedies as *Aconite*, *Gelsemium* and *Rhus*. Hot injections will sometimes prove useful.

MILK DISEASES—RED MILK.

Galactohæmia is an imperfect secretion wherein milk or colostrum and a red secretion are commingled. From some defect in the udder, or from a diseased condition resulting from over-stimulation by improper food, the secretion becomes imperfect and the organs are unable to secrete milk by the proper transformation of the blood.

It is the theory of some physiologists that food which is radically deficient in potash may be a cause of the disorder. The cow should always be well fed on the most wholesome food in order to avoid the development of this disease. When the disease occurs put her on a diet of good clover or cow-pea hay, cut and moistened, and give with it twice a day one quart of rye bran and one pint of linseed-cake meal, or pea or bean meal.

MEDICAL TREATMENT.

Argentum nitricum. The calf does not thrive or refuses the milk.

Asafœtida. Deficiency of milk with over-sensitiveness.

Borax veneta. Milk curdles soon after being drawn, tastes badly or has an offensive odor. Give third to sixth dilution three times a day.

Calcarea carbonica. Deficient or very scanty milk, with a distended udder.

Calcarea phosphorica. Milk tastes saltish; milk acid, thin, watery, neutral; udder sore to the touch; teats sore on pressure.

Causticum. Milk almost disappears from fatigue after long driving. Sixth dilution.

Chelidonium. Milk diminished.

Cinchona. Debility from excessive flow of milk. Third dilution.

Dulcamara. Suppressed milk from taking cold.

Ferri phosphoricum. Debility; want of appetite; cough.

Ignatia. Milk suppressed; homesickness; lowing for loss of calf. Third dilution.

Kali hydriodicum. Bloody milk, with wasting or diminishing of the udder. Third dilution.

Kali carbonicum. Give ten drops three times daily of the first dilution in the water drank, as long as the milk is bloody in appearance.

Lachesis. Milk thin and blue. Thirtieth dilution.

Millefolium. Total suppression of milk. Drop doses of the mother tincture.

Phosphoric acid. Scanty milk, with apathy and great dulness; debility from excessive milking. Give drop doses thrice daily in the water drank.

Phytolacca. Stringy milk; offensive odor in milk. Always give in garget or threatened garget. Give first or third dilution three times a day, ten drops.

Pulsatilla. Sudden suppression of milk. Sixth dilution.

Urtica urens. Entire want of secretion of milk after parturition.

CONSTIPATION.

Constipation is a term applied to a loss of power in the intestines by which the stools are difficult, or altogether obstructed.

The dung may become dry, hardened or impacted, or it may be soft and adhesive.

Among the sources of constipation in cattle is a diseased condition of the intestine caused by poisoning or frequent irritation by the use of "cathartic" drugs. One dose is sometimes a sufficient cause to induce the habit.

Constipation may be habitual in an animal of feeble constitution. It may occur as a result of many acute diseases. It is frequently caused by improper feeding, as giving dry rations of woody hay, or in the reaction after an excess of laxative food. It may be induced from impure air in a close, dark stable, from insufficient exercise, or from any cause that impairs the nervous force of the animal. Cows are especially prone to constipation in the last month of gestation. This should be avoided, as it is one of the conditions tending to produce apoplexy in the *colostrum* period, or the three days after calving. Give a sufficient amount of laxative food, such as sweet grass or green forage plants or cabbages, carrots and sugar beets, and linseed meal.

MEDICINES FOR CONSTIPATION.

Aconite. Dryness of the nose; much thirst; constant restlessness, especially if the animal has had a fright. Dose, ten drops of thirtieth dilution.

Alumina. Great straining, with soft adhesive stool; torpor of the rectum.

Belladonna. Congestion to the head; injected eyes; intolerance of noise and light. In acute diseases. Dose, ten drops of thirtieth dilution.

Bryonia. Stools dark, dry and hard; much thirst. Especially if the animal is lame or dreads to move because of soreness of any part, or in rheumatism or simple fever. Dose, ten drops of the sixth or thirtieth dilution.

Lycopodium. Great gurgling of wind in the bowels. The thirtieth dilution.

Nux vomica. After use of cathartics; alternate constipation and diarrhœa.

Opium. Stools very small, hard and black; general torpor of the system. Use the thirtieth or two hundredth dilution.

Plumbum acet. Stools compacted like sheep's dung, accompanied with violent colic pains. Use the two hundredth dilution.

Pulsatilla. Obstinate constipation after a severe attack of diarrhœa, especially in calves.

Ratanhia. Most obstinate and long-continued constipation. Use the sixth dilution.

Selenium. Stool so large and hard that it has to be removed by mechanical aid; shreds of mucus that look like hair in stool.

Sepia. Terrible straining; stool covered with mucus. Especially in calves or for cows in last month of gestation. Thirtieth dilution.

Silicea. The stool is lumpy and requires a number of severe efforts before it can be expelled. Thirtieth dilution once a day.

Sulphur. In all cases where other remedies fail to act give once a day a dose of the thirtieth dilution.

Zinc. Stools remarkably dry, hard and insufficient.

It may sometimes be found necessary to remove fecal matter by a small scoop or by the introduction of the hand, well oiled. Or an injection of warm water and

molasses may be thrown well into the rectum by a long flexible tube attached to the syringe. But it is best to so care for the health of all animals that such severe cases of constipation shall never occur. With a sufficient knowledge of feeding and by avoiding the old-fashioned cruel dosing it will be rare to meet with a severe case of constipation. Nothing more laxative than a little boiled flaxseed should ever be allowed in the treatment of cattle, and that with caution. Use carrots and other roots when they are in season.

The drugs for constipation are given in minute doses and at long intervals. They induce reaction by gently stimulating those portions of the nervous and muscular systems that are impaired or lacking in tone.

Extreme care, guided by knowledge and experience, with good judgment and prompt decision, are necessary factors in a good stock feeder. If, added to this, he can gain a fair knowledge of drugs and their use as *cures* he becomes well fitted to be the friend of good animals.

RHEUMATISM.

Rheumatism is a disease which attacks cattle more frequently than other domestic animals. The malady arises from malarial blood-poisoning in conjunction with a cold, moist atmosphere, or cold basement stables. The conditions are identical with those of the same disease in the human subject. A person who perspires easily and lives in a damp dwelling will scarcely escape rheumatism in some form. To prevent the disease is better than to try its cure. To guard against rheumatism in choice Jerseys, have only dry stables above ground. A barn with a basement will do more annual damage to a good herd, by causing rheumatism and other maladies, than it would cost to build an expensive sanitary stable.

CHARACTER AND SYMPTOMS.

Rheumatism irritates and inflames the joints, muscles, tendons, sheaths of nerves, and particularly the heart and heart-sac and pleura. It is painful in the highest degree, and may attack the healthiest animals, and become chronic. It is commonly of the chronic form in cattle, owing chiefly to lack of proper care and right treatment. In the acute form it may prove speedily fatal, especially if it attacks the heart. In acute rheumatism the animal is very restless, loses appetite, has dry skin, constipation, and apparent stiffness of joints and muscles.

The force of the disease may be expended chiefly upon one joint, with more or less painful swelling. The disease may move to other joints and muscles or suddenly change from part to part. This sudden transition from one part to another is characteristic of acute rheumatism.

Chronic rheumatism causes extensive structural changes in one or more joints, and sometimes causes abscesses, especially in the knee, when the joint may become enormously enlarged.

TREATMENT.

Aconite. Very useful in the acute form when there is much fever and soreness, especially if the disease is ushered in by shivering with great disturbance of the pulse. Give five drops of the third dilution every two hours until improvement begins.

Ammon. phos. Pain in the joints and spine, with great nervous irritability.

Give drop doses in water every four hours.

Arsenicum. Where there is great debility, with anxiety and restlessness, especially at night, and when hot applications relieve; *profuse perspiration*, and change to the heart. Use the third, thirtieth or two hundredth dilution.

Belladonna. High fever, hot, dry skin, and extreme soreness to the touch. Use the third to thirtieth dilutions.

Bryonia. Pain that is continually worse from the slightest motion; pains affect the legs, shoulders and ribs; thirst; stools very dry; breathing short; urine very red; *great dread of moving.* Use the third or thirtieth dilution in frequent doses. A very valuable remedy.

Comocladia. Great languor; painful swellings. Sixth dilution.

Cimicifuga. Very important for pains in the side and chest, as well as in all the joints. Use the first, third or thirtieth dilution.

Calcarea carb. Useful, and is needed in chronic rheumatism of the joints.

Calcarea phosph. Needful to complete a cure after other remedies have failed.

Chamomilla. Muscular pains, with great irritability of disposition, and especially to restore the milk which is usually suppressed in cows. Give the thirtieth dilution.

Gelsemium. Often a great relief for the *severe pains at night*, for partial paralysis, or great loss of muscular power; rheumatism of the legs, with great weakness, and little fever.

Give the first, third or thirtieth dilution, ten drops three times daily.

Phytolacca. Chronic rheumatism in damp weather; swollen glands, bone pains worse at night. Give the first or third dilution, three times daily, in ten-drop doses.

Rhus tox. Pains caused by wet weather or damp stables or from straining or injuries; the pains are worse during rest or when first beginning to move; better from exercise, warmth, external applications. *There is always great languor and excessive restlessness.*

Give the sixth or thirtieth dilution, in ten-drop doses.

Rhododendron. Bone pains in stormy weather.

Ruta. Pains in spine and legs.

Silicea. Chronic swelling of the joints and for abscesses or diseases of the bones in old cases. Give the thirtieth dilution once a day.

Spigelia. Inflammation of the heart and heart-sac.

In all cases the animal should be put into a dry, warm stable and have extraordinary care. The food should be very light until recovery is complete.

HOOVE—TYMPANITIS.

Ammonium causticum. Violent spasms of the stomach; difficult swallowing; panting breathing; violent trembling; rapid pulse; sudden starting. Give from five to ten drops of the watery solution in half a pint of water every fifteen minutes until relief is produced.

In all cases use hot injections at 140° Fahr.

From two to eight quarts of hot water may be gently injected, using an elastic syringe with a long flexible tube, to be passed into the rectum. This will speedily allay the pain and inflammation.

Colchicum. Swelling and puffiness of the belly; alternate heat and coldness; scanty, red urine; stool very hard and dry or loose, with mucus and blood, preceded by severe colic pains. Uneasy, constantly changing position; pawing the ground; stamping the hind feet; lies down and gets up, turns from side to side; the hair stands on end; great distress when the animal attempts to urinate; tender to the touch; full of wind; great distention. Give ten drops of the first or third dilution every fifteen minutes.

Colocynth. Paroxysms of violent colic every half hour or at shorter intervals. Loose, thin stools.

Give the sixth dilution, ten drops at each paroxysm.

Hyposulphite of Soda. Give first trituration for fermentation of food in stomach.

Lycopodium. Weak stomach; animal has frequent attacks of indigestion; great rumbling and rolling of wind in the bowels. Give a dose of ten drops of the thirtieth dilution every half hour in acute cases, and once a day for chronic indigestion. This remedy should cause flatulence to be discharged freely.

Nux vomica. Give during last stages or for chronic indigestion, especially if the animal has had cruel treatment by excessive dosing with violent medicines. One dose a day at night of the third, sixth or thirtieth dilution.

When remedies fail to relieve the hoove, and the rumen remains inflated or the tympanitis increases, a trocar and canula must be inserted, after making a small cut through the skin, and penetrate to the interior of the rumen and allow the gas to escape. The opening should be made midway between the last rib and the hip, and about nine inches below the transverse lumbar bones.

ACCLIMATION FEVER.

Aconite. Simple fever; restlessness; thirst; timidity. A dose of the thirtieth dilution daily.

Nux vomica. Depraved, fastidious or capricious appetite, with constipation.

SUN-STROKE.

Glonoine. If a cow seems dizzy or falls off in her milk, or stops her cud after being a few hours exposed to the sun in very sultry weather, there is danger of great injury. She should be treated precisely as for sun-stroke in the human subject, by applying, every five or ten minutes, to the crown and neck sponges saturated with water at from 130° to 140° temperature, and a dose of Glonoine, thirtieth dilution, every fifteen minutes until all signs of danger are passed.

GARGET.

Phytolacca. Udder distended, hard and hot. Give every two or three hours ten drops of the first, third, or sixth dilution in a little water. Wash the bag with a lotion of hot water and Phytolacca, using one teaspoonful of the tincture to a pint of water. After bathing the udder for ten or fifteen minutes with gentle friction and manipulation of the milk-glands, immerse the whole udder in hot water (125°) by means of a rubber bag. The process of bathing and immersing should be repeated several times a day until the udder recovers a normal condition. Milk-tubes may be used to advantage in some cases.

SORE TEATS.

Arnica. The teats have been scratched or bruised. Give the first dilution internally and a weak lotion externally. Milking tubes may be necessary.

Chamomilla. The teats are inflamed and very tender; hard, knotty tumors in the udder. Give a dose of the sixth dilution three or more times a day.

Hydrastis. Ulcers on the teats which will not heal. Use the sixth dilution internally, and for a lotion one part of Hydrastis tincture to a hundred parts warm (102°) water. Apply three or more times daily, and follow with Vaseline.

WARTS ON TEATS.

Thuya. Give a dose of the sixth or thirtieth dilution daily. Apply a lotion of one part Thuya tincture to sixteen parts warm (102°) water daily. Always give Thuya internally for warts, and continue the remedy for six weeks, one dose daily. If the warts do not disappear they may be carefully touched with chromic acid or with nitric acid, using the point of a small wooden toothpick, always taking care that the teat is covered by slipping a piece of kid leather over the wart. The warts

may also be destroyed by applying a concentrated solution of wood-ash lye in the same way. Always use the Thuya internally, however.

Ol. Ricini. Castor Oil applied externally twice a day is often effective.

INDIGESTION IN CALVES.

Owing to the artificial methods which obtain in the rearing of calves it will readily be seen that there are many causes for indigestion. From the use of artificially prepared food and the too rapid swallowing, and the numerous incidental changes that accrue, disordered assimilation and indigestion may depend upon, 1. *Insufficient or altered saliva*; 2. *Deficient action of the gastric juice*; 3. *Deficient action of the pancreatic juice*; 4. *Disordered liver*; 5. *Deficient action of the intestinal juice*; 6. *Nervous irritation*; 7. *Altered blood supply.*

PREVENTION OF INDIGESTION IN CALVES.

It is of the highest importance that the digestive organs of the young Jersey should always remain in the normal state of perfect health.

The breeder, to be successful in the management of his young stock, cannot neglect this point without suffering disastrous consequences, in the loss of his most valuable animals and the deterioration in quality and vigor of his whole herd.

The powers of digestion and assimilation must have their full development in the young calf through good management. Serious diseases, accruing from carelessness and ignorance, will surely follow even slight neglect.

Milk, according to the eminent chemist, E. Duclaux, is only assimilated by animals after it has received treatment by two ferments—*rennet* and *casease.*

This noted chemist has not only demonstrated this proposition by numerous experiments, but practical breeders and others have shown that calves may be kept from indigestion, and the violent diseases resulting therefrom, by the punctual addition of a small quantity of prepared rennet after the milk has been warmed for feeding. It is well to have some arrangements by which the calf will be compelled to drink the milk slowly, so as to mix it with the secretions of the mouth.

For this purpose an artificial teat, made of rubber, and attached to a wooden float, is placed upon the surface of the milk, and the calf sucks the fluid at leisure.

It is necessary, however, to pay strict attention to the cleansing of this instrument, by washing and scalding, after each feeding.

The calf must also be placed in a very dry, well-ventilated stall, provided with plenty of soft bedding and an abundant admission of sunlight. If all these requirements are met and steadfastly followed by all Jersey breeders the results will be of immense benefit to every one of them, and the Jersey interest in America will be greatly promoted and rendered highly remunerative.

With the above treatment of the milk, calves will require full rations, according

to size and rapidity of growth. But if from climatic or other unknown causes gastric disorders appear, diminish the ration from one half to two thirds, and give, in addition to the rennet, the medicines prescribed for indigestion, constipation or diarrhœa, according to the indications given in those sections of this work relating thereto. In addition to the foregoing, let it be remembered that calves require the free use of soft, pure water to quench thirst, and this must be amply provided for them, and always at a temperature of about from 65° to 70° Fahr.

In addition to the former simple preparation of rennet I would suggest that a preparation be made which can be used in the form of a powder, making a permanent, long-keeping article, which may be styled LACTO-RENNETINE.

FORMULA.

Pure milk sugar	40 ounces.
Pure rennet	10 ounces.
Pancreatine	5 ounces.
Ptyalin	4 drachms.
Lactic acid	5 fluid drachms.
Hydrochloric acid	5 fluid drachms.

I believe that such a preparation, if made of pure articles, would excel, in beneficial effects, the rennet alone, and produce always uniform results.

DIARRHŒA IN CALVES.

Aconite. Stool bloody, slimy, mucus, small, frequent; worse after exposure to cold, dry winds; after fright; after being overheated; after getting wet in rain; in summer after cool nights; restlessness; great thirst; dry heat; quick pulse. Dose of sixth dilution after each stool.

Aloe. Involuntary stools after feeding; pain in stomach; loud gurgling in the belly, like water running out of a bottle. Sixth dilution.

Arsenicum. Stool thin, watery, frequent, scanty; *worse after feeding with cold milk; great restlessness; great thirst;* weakness; emaciation; rapid exhaustion. Thirtieth dilution.

Baptisia. Stool of pure blood; low states; fevers. Tincture, five drops.

Benzoic acid. Stool watery and white; copious; very offensive and pungent odor; urine dark colored, and very strong smelling.

Bryonia. Undigested stools; aggravated by warm water and by moving about. Desire to be quiet.

Camphor. Stools involuntary; attack very sudden; worse from hot sun; sudden collapse, with coldness of the whole body. Use first or third dilution.

Capsicum. Stool of tenacious mucus, frequent, small; worse after feeding, with cutting colic; difficult urination; shivering after drinking.

Carbo vegetabilis. Stools thin, frequent, putrid; worse from cold milk or cold water; flatulent distention of the belly; coldness; collapse.

Chamomilla. Stools hot, small, frequent, with smell like rotten eggs; worse from taking cold; colic.

Cinchona. Undigested stools; frequent, involuntary, painless; worse after feeding; colic from gas in belly; distention of the belly; great weakness; sweating.

Cina. Diarrhœa, with pin-worms.

Cistus. Thin, hot, squirting stools.

Colchicum. Stools watery or mixed with white mucus; profuse; worse in hot, moist weather; straining; colic; distention of the belly with gas; weakness; prostration.

Cotoin. Where Arsenicum temporarily relieves; persistent chronic diarrhœa.

Colocynth. Frothy, liquid stools; sour, putrid, musty; worse from cold milk. *Cutting, violent colic, which makes the animal bellow with pain.* Give frequent doses of the third or sixth dilution until colic is relieved. Use injections of hot water at 130°.

Croton tiglium. Watery stool, *coming out like a shot; worse after drinking cold milk.* Better from a moderate quantity of hot milk at from 120° to 130°. Colic, with writhing pains; soreness of the intestines. Add rennet to milk at time of feeding.

Dioscorea. Watery stools; profuse; violent, twisting colic, occurring in regular paroxysms with remissions; colic relieved by pressure on the belly, by walking, and by rubbing. Use injections per rectum at 130°.

Hamamelis. Stool of pure blood. Tincture, five drops.

Hepar sulph. Whitish, sour-smelling stools; painless; *indigestion; chronic diarrhœa.* Use the sixth or thirtieth dilution. A grand remedy. Add a little rennet before feeding the milk.

Lycopodium. Stools thin, fetid, painless; worse after a feed of milk; the belly fills with gas from very little food; rumbling of wind in the belly; weakness, emaciation, prostration.

Nux vomica. Stools thin or bloody, alternating with constipation; worse from too much drugs; urging and straining constant; colic and griping; much gas in belly; emaciation.

Opium. Offensive, involuntary stools; worse from fright or any excitement. Use third or sixth dilution.

Phosphoric acid. White, watery diarrhœa, painless. Dilute acid, one tenth in water. Add a little rennet to the warm milk.

Podophyllum. Profuse, frequent, gushing stools.

Pulsatilla. Stools *watery, greenish, yellow or very changeable; very frequent; loss of appetite; emaciation; chilliness; worse at night; worse from poor milk;* painful, rumbling flatulence.

Sepia. Worse from boiled milk; rapid exhaustion; chronic diarrhœa.

Silicea. Liquid, slimy, frothy stools; worse from exposure to cold air; better from warmth; milk not digested; *hard, hot, distended belly; emaciation.*

Sodæ hyposulph. For fermented stools give the first trituration.

Sulphur. Watery, undigested stools; changeable, frothy, sour, fetid. Expulsion sudden or involuntary; worse in the early morning; worse after a feed of milk; colic; straining; should be given when other remedies fail to produce their usual effects. Give doses of the thirtieth dilution in a little water.

Thuya. Stool forcibly expelled; copious; gurgling, like water from a bunghole; worse after feeding; rapid exhaustion; rapid emaciation.

Veratrum album. Stools frequent, profuse, thin; worse at night in hot weather; *preceded by pinching colic;* great sinking and weakness; skin cold; prostration; collapse.

Calves should be put upon a smaller allowance of milk as soon as indigestion or diarrhœa is indicated. *The milk should always be sweet, the feeding vessels scoured, rinsed, scalded, rinsed again, and dried in the sun.* If colic occurs the animal should be fed but very lightly twice a day. Every effort should be made to bring the calf back to good health as soon as possible. As soon as the first signs of diarrhœa occur a dose of sulphur (sixth dilution) may be given, unless the symptoms indicate some other remedy, and a raw egg may be beaten and mixed with the milk. If the case of any calf seems desperate do not give it up till every effort fails. If there is violent colic and collapse apply hot-water bottles to the belly, legs and back. Rub the belly with a roller and give the remedies as described above as long as the calf will swallow. You will probably save the calf by such persistent effort and careful nursing, with the medicines given as directed. Keep the calf blanketed in cold weather.

SELF-ABUSE IN THE BULL—SPERMATORRHŒA.

This bad habit of self-abuse in bulls is very common, and the results are disastrous to the breeder. The conditions are owing to an excessive irritability of the seminal vesicles, or to a general disorder of the sexual system.

Among the causes of this form of spermatorrhœa are too early service; excessive service; solitude in dark stable; insufficient daily exercise in the open air; worms in the intestines or rectum. The animal becomes so excitable that the sight of another animal or the presence of a human being causes a sudden effort and an ejaculation. Such a frequent drain from the system of this important vital secretion soon produces a change of character in the animal. If he does not become speedily

impotent he is an uncertain server and slow, his disposition becomes either very sluggish or very desperately ugly and fierce, and his progeny are necessarily inferior. He becomes susceptible to acute and fatal diseases, and sooner or later becomes permanently impotent.

TREATMENT.

Avoid all causes of self-abuse, and stop the cause that induces it as soon as it can be ascertained. As soon as the first indications of such a habit present themselves prepare and adjust a broad leather girth around the loins, with a piece of fine steel chain about a foot long set in the girth so as to cross the spine in front of the hips. This must have a buckle and be so arranged as to fit just tight enough to bring a strong pressure of the chain upon the back at the first effort.

MEDICINES.

I would recommend trial of the following remedies to assist in curing the bad habit at its very beginning:

Camphora. Great depression and lack of power. Give first, third and thirtieth dilutions in rotation daily.

Cantharides. Great irritability of the sexual organs. Give ten drops third dilution three times a day.

Cina. Irritability from worms in rectum. Give first, third or thirtieth dilution daily. Also inject into the rectum a pint of warm milk in which has been mixed a drachm of tincture of aloe; once a week it may be repeated.

Damiana. Great seminal excitability. Use the sixth dilution.

Gelsemium. Want of irritability; relaxation; lack of tone. Give ten drops of first or third dilution three times a day.

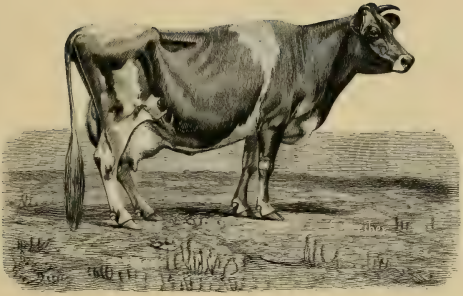
Nux vomica. Indigestion; constipation; lack of vital force. Give first third and thirtieth dilutions in rotation daily.

Phosphoric Acid. Very frequent emissions on the slightest excitement. Use the pure acid, one part to one hundred parts of pure water, ten drops of mixture twice a day.

Picrate of Zinc. When the lack of energy and true vigor threaten impotency. Give the sixth or thirtieth dilution in ten-drop doses twice a day.

Sulphur. When irritability increases in spite of the use of any remedy, or when the system does not respond at once to the remedy selected. Give the first and third or thirtieth *triturations* in rotation once a day.

The Butcher is the last remedy and a sure cure.



EUDORA 1863.

AT 18 YEARS OLD.

BILLINGS HERD.

FREDERICK BILLINGS, WOODSTOCK, VERMONT.

COUGHS.

BRONCHITIS.

Lung diseases are too common among dairy cattle. A proper attention to the ventilation and temperature of stables, and the protection of cattle from rain and cold winds, would prevent the majority of cases of bronchitis, pneumonia and tuberculosis, and also render cattle less susceptible to contagious pleuro-pneumonia.

Ample provision must be made for a perpetual supply of pure, unadulterated, ozonized air in the stable for every hour of every day of the year, and also for rendering such air of the proper temperature, so that the animals may never be chilled by cold currents or oppressed by too high a temperature.

Bronchitis is acquired from chilling air impinging upon animals while standing in their stalls, or from exposure to cold rains or to dry cold winds in autumn and winter. The cough is at first short, hard and dry, but soon becomes moist and more prolonged, with a varying degree of mucous secretion. This may become, if not properly treated, a chronic cough and last for months or years. Oftentimes a chronic dry cough is the result of nervous irritation, sympathetic or otherwise, and may be the result of worms or other parasites that excite a reflex action in various nerves.

TREATMENT.

Aconite. Fever; dry nose; restlessness; use in the first stages, especially if caused by exposure to cold, dry winds. Use the third, sixth or thirtieth dilution.

Apis mellifica. The cough is suffocative, painful, with much difficulty of breathing.

Arsenicum album. Cough remaining after influenza or catarrh; dry cough, with watery discharge from the nostrils. Give the sixth or thirtieth dilution.

Belladonna. Cough in the larynx or in the windpipe; painful cough from inflammation of the bronchial membranes, with fever and depression; dry cough.

Bryonia. Cough in larynx, windpipe and the large bronchial tubes; dry cough from irritability of the upper air passages, especially in morning; cough from pressure on windpipe; from exposure to cold wind or from the least exercise; cough that causes pain; breathing quick; phlegm frothy. Thirtieth dilution.

Causticum. Persistent hacking cough. Thirtieth dilution.

Hydrastis. Debility; mucus thick and ropy. Use the third or sixth dilution.

Ipecac. Rattling, convulsive cough, with difficult breathing.

Drosera. Deep, hollow, groaning cough.

Kali carb. Chronic cough.

Cina. Cough arising from worms. Animal presses its nose against the wall.

Iodide of Arsenic. Windpipe cough, with thin discharge from nostrils. Sixth or thirtieth dilution.

Mercurius sol. Catarrh of all the respiratory mucous membranes, but especially the larynx and nasal region. Third, sixth or thirtieth dilution.

Nux vomica. Nervous, spasmodic cough; a chronic cough, arising from irritability of the digestive organs; discharge of flatulence from the rectum while coughing. Third or sixth dilution.

Opium. Convulsive, dry cough in paroxysms at night.

Pinus. Chronic, short, feeble, hacking or grunting cough. Use drop doses of the mother tincture, or a decoction of white pine needles and the tree bark.

Phosphorus. Cough arising from inflammation of the small bronchial tubes or lung substance. Chronic cough; dry, short, frequent, racking cough; distress from difficult breathing, with discharge of reddish or yellowish mucus. Third, sixth or thirtieth dilution.

Populus balsamifera. Chronic catarrhal cough. Use drop doses of the saturated tincture.

Rumex crispus. Cough in throat and windpipe; frequent cough from the slightest exertion.

Sulphur. When other remedies do not produce the expected result. Third, sixth or thirtieth dilution.

Spongia. Sharp, shrill, ringing cough, or dry, hollow, barking and hooping cough.

Tartar emetic. Chronic cough, where the whole respiratory organs seem loaded with a loose, rattling mucus.

PNEUMONIA.

Bulls seem to be especially prone to attacks of pneumonia. Alternate heat and coldness of the ears and horns; costiveness or diarrhœa; short, oppressed breathing; dry muzzle; dry, harsh, frequent cough; loss of cud; intense thirst; lassitude; discharge of water and mucus from the nostrils, and later on bloody or rusty discharges; brilliancy of the eyes; sensitive tenderness of the spine; continual change of heat, with or without shivering; partial or general sweating. In severe cases the panting becomes laborious; the flanks heave; the nostrils expand, emitting discolored, fetid mucus; the strength fails; the legs are drawn under the belly, which is contracted and puckered; the evacuations become putrid; the eyes have an offensive discharge; the pupils are dilated; the breath becomes cold, and the animal sinks.

TREATMENT.

Aconite. In the first stage, especially if the animal has been exposed to cold, dry wind, and is very restless.

Arsenicum. Great thirst; prostration.

Belladonna. Congestion of brain; dilated pupils; drowsiness, with frequent starting, as from fear.

Bromine. When the lungs become solid like liver. Give the second, third or sixth watery dilution, ten drops every hour.

Bryonia. Pain and dread upon the slightest motion; great thirst for large draughts.

Carbo vegetabilis. Rattling in lungs; great prostration; fetid discharges, especially in last stage. Use third or sixth trituration.

Cuprum nitrate. Suffocative spells; diarrhœa.

Ferri phos. In first stage. A very important remedy. Use third or sixth trituration.

Lycopodium. Sweat without relief; fan-like movement of the nostrils; rumbling of wind in the bowels. Use sixth or thirtieth dilution.

Phosphorus. In catarrhal pneumonia. Give the sixth or thirtieth dilution, ten drops every two or four hours.

Sanguinaria. Extreme difficulty of breathing; tough, rust-colored mucus; pulse weak; extremities cold. Use the third, sixth or thirtieth dilution, with frequent doses.

Tartar emetic. Great rattling of mucus; much coughing; great suffocation. Sixth or thirtieth dilution, ten drops every hour.

Veratrum viride. When the pulse is hard and *very slow*. Sixth dilution.

Sulphur. When there is heard, by applying the ear to the chest, a *fine crackling* or *crepitant rattle*.

Give the sixth trituration, a teaspoonful of the powder every two or three hours.

TUBERCULOSIS—CONSUMPTION.

Lung tubercle, abortion and apoplexy are the three scourges of the dairy cattle-breeder.

When the diagnosis of consumption is clear the animal should be slaughtered and buried deep in dry soil. Such animals must not be used for breeding, as the defect would thereby be propagated, while the milk and flesh will be liable to communicate the disease to the human subject. This disease is most frequently generated by close, dark, non-ventilated stables, especially in malarial regions.

To prevent lung tubercle supply the stables with proper ventilation; every animal requires twelve hundred cubic feet of fresh air each hour. The disease is

contagious to a certain degree. Quarantine doubtful cases, but do not fail to use the knife in every instance of tubercular development.

Among the remedies to be used upon doubtful cases are the following :

Calcarea carbonica. Loose, rattling cough ; dulness of lung upon percussion. Thirtieth dilution.

Ferri phos. Congestion of the lungs, with dulness and frequent cough.

Hepar sulphuris. Cough, excited by cold air. Thirtieth dilution.

Iodine. Emaciation ; cough. Thirtieth dilution.

Iodide of Potash. Dulness of lung ; cough, with thin discharge from nostrils. Third dilution.

Jaborandi. Very profuse sweating. Third dilution.

Lycopodium. Fan-like motion of nostrils ; rattling of flatulence in bowels ; dulness of lung. Thirtieth dilution.

Pinus. Chronic hacking, or racking, dry cough.

Phosphorus. Dry, tight, tormenting cough ; loose stools ; sweat.

Sambucus. Profuse sweat.

CONTAGIOUS PLEURO-PNEUMONIA.

This is not a common disease, and under our efficient quarantine regulations it is not probable that the country will ever suffer very seriously from this much-dreaded malady.

Gamgee gives the following description of the symptoms of this disease : "From the time that an animal is exposed to the contagion to the first manifestation of the symptoms a certain period elapses : this is the period of incubation. It varies from a fortnight to forty days, or longer. The first signs proving that the animal has been seized can scarcely be detected by any but a professional man ; though, if a proprietor were extremely careful, and had painstaking individuals about his stock, he would invariably notice a slight shiver usher in the disorder, which for several days, even after the shivering fit, would limit itself to slight interference with the breathing, detected readily on auscultation (by the ear).

"Perhaps a cough might be noticed, and the appetite and milk secretion diminish. The animal becomes costive and the shivering fits recur. The cough becomes more constant and oppressive, the pulse full and frequent, usually numbering about 80 per minute at first, and rising to upward of 100. The temperature of the body rises, and all the symptoms of acute fever set in. A moan or a grunt, in the early part of the disease, indicates a dangerous attack, and the alæ nasi, or nasal cartilages, rise spasmodically at each inspiration ; the air rushes through the inflamed windpipe and bronchial tubes, so as to produce a loud, coarse, respiratory murmur ; and the spasmodic action of the abdominal muscles indicates the difficulty the animal experiences in the act of expiration. Pressure over the intercostal spaces and

pressing on the spine induce the pain so characteristic of pleurisy, and a deep moan not infrequently follows such an experiment.

"The eyes are bloodshot, the mouth clammy, skin dry and tightly bound to the sub-cutaneous textures, and the urine is scanty and high-colored.

"On auscultation the characteristic, dry, sonorous râle of ordinary bronchitis may be detected along the windpipe and in the bronchial tubes. A loud sound of this description is not unfrequently detected at the anterior part of either side of the chest, while the respiratory murmur is entirely lost posteriorly, from consolidation of the lung. A decided leathery friction-sound is detected over a considerable portion of the thoracic surface. As the disease advances, and gangrene, with the production of cavities in the lungs, ensues, loud, cavernous râles are heard, which are more or less circumscribed, occasionally attended by a decided metallic noise. When one lung alone is affected the morbid sounds are confined to one side, and on the healthy side the respiratory murmur is uniformly louder all over.

"By carefully auscultating diseased cows from day to day interesting changes can be discovered during the animal's life-time. Frequently the abnormal sounds indicate progressive destruction; but at other times portions of lung that have been totally impervious to air become the seat of sibilant râles, and gradually a healthy respiratory murmur proves that, by absorption of the materials that have been plugging the lung-tissue, resolution is fast advancing.

"Unfortunately we often find a rapid destruction of lung tissue and speedy dissolution. In other instances the general symptoms of hectic or consumption attend lingering cases, in which the temperature of the body becomes low; the animal has a dainty appetite, or refuses all nourishment. It has a discharge from the eyes and a fetid, sanious discharge from the nose, but unfrequently it coughs up disorganized lung tissue and putrid pus. Great prostration, and, indeed, typhus symptoms set in. There is a fetid diarrhœa, and the animal sinks in the most emaciated state, often dying from suffocation, in consequence of the complete destruction of the respiratory structures."

Dr. James Moore thus describes the disease:

"**First stage.** It begins in one of three ways: Firstly, it may attack the cow suddenly, and run a rapid course in spite of all treatment; secondly, it may come on slowly and insidiously, the cow appearing not to be very ill, while the lungs are becoming diseased beyond the hope of restoration; and, thirdly, it sometimes begins with violent purging, followed by great weakness and loss of flesh. The majority of cases, however, present the following symptoms: a short, dry, husky cough, which is heard only occasionally; it is highly characteristic of this disease, and when once heard cannot be mistaken again. The owner says, perhaps, that he has heard this 'hoose' for two or three days, but thought no more about it. On inquiry it will

be found that the beast does not give as much milk as usual, and that has a slightly yellowish tinge; the appetite is not much worse, yet still she is careless about her food, and does not lick her dish clean; when at rest the breathing may not show any departure from its healthy play, but when the animal is moved and walked some distance it becomes more frequent, labored and difficult; the pulse is often healthy in character, although sometimes it is weak and slightly increased in frequency; the bowels may either be confined or purged, or quite regular; the body is sometimes hot, sometimes cold.

"The cow appears dull and listless; when at grass she separates herself from the others, and lies on the ground while they are browsing.

"**Second stage.** The cough is now more frequent, and thick, frothy phlegm dribbles from the mouth; the breathing is short when the air is taken into the lungs, and long when it is pressed out of them; the inward breathing is attended with much pain, which causes the animal to grunt and to grate her teeth; the grunt is heard when the animal is pressing the air out from the lungs; the pain is much increased by coughing and change of position, and to lessen it the cough is now suppressed, or held back and short, and the cow stands fixed in one place. The pain is owing to the pleura being inflamed, and the position of the diseased place may be ascertained by pressing the side, between the ribs, with the point of the thumb; when pressed on the animal will flinch and grunt.

"The pulse is quickened and oppressed; the skin is hard, tight, and bound to the ribs; the horns are hotter and the muzzle dryer than usual; the head is lowered and thrust forward, with the nose poked out; the back is raised up; little or no food is eaten; the cud is seldom or never chewed; the milk is stopped; the bowels are bound, and, when moved, the dung is in hard, dry lumps.

"**Third stage.** The breathing is much quickened, very difficult, labored and even gasping; the breathing is carried on partly through the mouth, partly through the nostrils; the breath has a bad smell; a stringy, frothy fluid constantly dribbles from the mouth; the cow groans loudly and frequently, while the grunt is either gone or subdued; the pulse is quick, weak, and in some cases imperceptible or intermittent; the horns, ears and legs are cold, the skin covered with cold sweat, the head and neck stretched out, with the nose poked into the corner of the manger; the fore legs are separated from one another and fixed in one place, unless the cow is restless and uneasy; sometimes the hind legs are crossed over each other, or the hind fetlock joints are knuckled forward; the stoppage of milk is complete; the animal is reduced to a skeleton; the strength is also of course greatly impaired, and the beast can scarcely cough; insensibility sometimes steals over her; the urine is very highly colored; toward the last violent purging comes on, the discharged matter being quite watery, blackish, highly offensive, and sometimes mixed with blood; eventually the cavity of the chest becomes so full of fluid, or so much of the lung is

condensed, that the breathing, from being more difficult and frequent, at last ceases, and the animal is dead."

TREATMENT.

Aconite. Pulse hard and quickened; shivering or trembling, attended with coldness of the legs or the horns, and dry heat of the skin; breathing short, painful, anxious, attended with open mouth and groans. Give the third or sixth dilution, ten drops every hour.

Ammonium causticum. Quick, difficult breathing, with rattle; inhalation of air very short, from pain; frequent cough, with discharge of mucus; great languor and listlessness; pulse feeble and quick; frequent shivering; skin at first hot and dry, afterward moist.

Give five drops of the watery solution in a little water every two or three hours till improvement begins.

Arsenicum. Wheezing; hurried breathing; small, quick pulse; great weakness; cold, clammy sweats; frequent short cough; purging in every stage.

Give ten drops of the sixth or thirtieth dilution every two hours.

Baptisia. Stupor; listlessness; restless, but too lifeless to move; eyes congested, look red and inflamed; thick mucus from nose; fetid odor from mouth; can only swallow water; distended abdomen; mushy stools or dark, very offensive stools; great prostration; urine scanty and dark; oppressed breathing, with cough; pulse at first accelerated, afterward slow and faint; pain along the back; restless, uneasy, or drowsy and stupid; chilly; great prostration, with tendency of the fluids to decompose. Discharges and exhalations fetid; ulceration of mucous membranes, especially of mouth, with tendency to putrescence; intolerance of pressure; constant change of position.

Give drop doses of the saturated tincture, or of the first and third dilution, every two hours, in a little water.

Bryonia. Frequent, short, suppressed cough, which seems to cause sharp pain in the chest; breathing short, with characteristic grunt; when the ribs are pressed by a hand or a finger the cow flinches and utters the short grunt, as if the pain were very acute; the animal dreads to move from pain.

Give ten drops of the third, sixth or thirtieth dilution every two to four hours.

Lycopodium. Fan-like motion of the nostrils; loose stools; rumbling of flatulence in the bowels. Give ten drops of the thirtieth dilution every two to four hours.

Phosphorus. Difficult, obstructed breathing; pains in chest; pain between ribs; frequent short cough, with slimy phlegm, sometimes mixed with blood; violent purging, like gushes of water; wasting, weakness and prostration. Give ten drops of the sixth or thirtieth dilution every two, three, or four hours.

Sulphur. During convalescence, or when the other remedies do not act promptly.

Give ten drops of the sixth or thirtieth dilution in a little water three times a day.

The diet should be oat-meal gruel and boiled carrots. All animals should be quarantined most securely for ninety days. No healthy animals that have been in the same stable should be allowed to mingle with healthy cattle within a period of ninety days. A cow, whether in sickness or health, needs one thousand two hundred cubic feet of air per hour, and the system of ventilation should admit of a constant change of air to that amount without subjecting the animal to chilly currents.

LOCKJAW—TETANUS.

This disease is usually the result of a slight wound, and in some localities is very common to man and beast, especially if the wound is caused by some blunt instrument and does not bleed much. Exposure to wet and cold increases the liability of attack. There is also some uninvestigated source of aggravation, as evidenced by the varying prevalence of the disease or its aptitude for certain localities.

Among cattle the pulse may be at first apparently normal, presenting but little disturbance until the disease has become perilous; the muzzle, horns and ears are also normal; the animal stands rigidly fixed, or appears afraid to move; the head is extended horizontally forward; the nostrils dilated; the eyes bulging outward, or sunken and retracted, the membrane at the corners partly covering the eyeball; the tail elevated and tremulous; the legs splayed out; the quarters depressed; all the muscles rigidly fixed, so that the animal cannot bend; the muscles of the belly and neck tense, stiff, and in hard ridges; the teeth convulsively clinched or slightly parted. *The Country Gentleman* of July 31st, 1884, gives this case, which conveys a moral: "Beware of Pitchforks.—Died, of lockjaw, July 11th, 1884, Signalda 2d 6748. Signal 1170 is close on both sides of his pedigree, and he was no mean representative of that long line of fine breeding. About a month before his death he was pricked with a pitchfork for breaking up his water-tub. He was kind and gentle."

TREATMENT.

Arnica. After all wounds, however slight, give this remedy, either in drop doses of the tincture or the third, sixth or thirtieth dilution.

Arsenicum. Great thirst; restlessness; rigidity remaining after the use of other remedies.

Give drop doses of the thirtieth dilution on the tongue three or more times a day.

Belladonna. Where wounds are greatly inflamed, with great heat and much fever.

Bryonia. The animal dreads to move or be touched.

Camphor. Great prostration; languor. Give the tincture or first dilution, one drop every hour upon the tongue or by olfaction.

Gelsemium. Great debility; convulsive spasm; congestion to head. Give the tincture or first dilution, one drop every half hour upon the tongue.

Nitrate of Amyl. This remedy may be used as a palliative where the spasms are desperately rigid. It is given by inhalation, ten to twenty drops upon a small sponge enclosed in a napkin folded in conical form.

Nux vomica. This is the most important and distinctively homœopathic remedy. Give the sixth or thirtieth dilution, ten drops upon the tongue every three or four hours. Some cases may require the saturated tincture in doses of from one to five drops, while others may do better when given the two hundredth or one thousandth dilution.

Passiflora incarnata. A very important remedy in the first stage. Give one drop of tincture every hour, or as Nux vomica.

In all cases where practicable immerse an inflamed limb in hot water (130° to 140°), or apply saturated cloths or sponges of the same temperature. There is nothing like hot water to relieve inflammation, congestion, and the agonizing pain resulting from wounds.

BROKEN HORN.

The Jersey horn is fine and fragile, rendering it liable to fracture and casting of the shell upon slight provocation. When fighting, or even rubbing against a fence or tree, a shell may be broken or knocked off, and followed by a severe hemorrhage from the vessels at or near the base of the horn, and sometimes a very slow recovery.

TREATMENT.

To check hemorrhage apply the solution of subsulphate of iron (*Liq. Ferri subsulph.*) to the bleeding parts until a clot is formed. When the clot falls off and there is no more bleeding apply bandages saturated with a dilution of tincture *Calendula officinalis* in water, one part tincture to sixteen parts of water. The *Calendula* is the best lotion for all forms of lacerated wounds in any part of the body. Continue the application until the healing of the parts, which will be rapid if the cow is otherwise in good health.

"Styptic cotton," or cotton saturated with the subsulphate of iron, is convenient for application to most conditions of hemorrhage.

LOTIONS AND UNGUENTS.

Calendula. For lacerated wounds this is a rapidly healing wash. Dilute with twenty parts water and keep the parts wet.

Hamamelis, or Witch Hazel. For inflamed surfaces and inflamed veins the best application. Also valuable in hemorrhages. Apply diluted, one to ten, with hot water.

Arnica. For all bruises and sprains without laceration. Dilute with hot water, one part tincture to ten parts water.

Phytolacca. For garget. Dilute with hot water, one to sixteen.

Hydrastis. For old ulcers, for eruptions by poisoning, like poison sumach, or rhus-poisoning. Dilute with hot water, one part tincture to one hundred parts water.

Thuja. Use for warts at any time the pure tincture.

Castor Oil. For warts apply pure when the cows are dry.

Listerine. Use for vaginal injections and for deodorizer.

Calendula Vaseline. Apply to all wounds or burns.

Mutton Tallow. Apply melted to sore teats and ulcers.

Vaseline. Very useful for many eruptions and sores.

Crude Petroleum. Useful in alternation with Phytolacca for garget.

DISINFECTANTS.

The best disinfectant is absolute cleanliness.

Remove all discharges and wash the stalls each day.

If there is any evidence of contagious disease the cattle that are infected should be quarantined at a distance from all others.

DISINFECTION WITH PURE CHLORINE GAS.

For the destruction of the germs of disease in buildings where contagious pleuro-pneumonia and other dreaded destructive maladies have existed, the most effective method of disinfection is probably with pure chlorine gas. This method is recommended by Professor Doremus for old hospitals where the walls are permeated with filth, and for the destruction of the cholera germ, and other disease elements.

Dr. Doremus says: "The gas must be used in large quantities. We spread out large sheets of lead and turned up the edges so that they would hold the chemicals for generating the gas. I would have three or four assistants, and when ready the word was given to 'pour.' Then all would run out and the door would be fastened, and the gas penetrated everything. To have entered the room during the time would have been certain death." Chlorine gas may be made in large quantities, by pouring slightly diluted sulphuric acid upon a mixture composed of common salt and oxide of manganese in large leaden vessels. Its development requires care. It is safer to have the pouring done automatically than to risk human life in the experiment.

GERMICIDES.

The method of Dr. Doremus is expensive and only advisable in special cases.

Mr. John C. Pennington, chemist, of Paterson, N. J., who has made thorough and persistent experiments in the propagation of various forms of bacteria, in his studies of the germ-theory of disease, has found that the salts of mercury are the most effective germicides or disinfectants. He uses the *bichloride of mercury* in a solution of one part to a thousand of water, sprinkling it in the air and upon walls with a brush or whisk-broom. He also uses the *hyposulphite of mercury* in the same manner, with similar results, in annihilating the bacteria which float in the air or contaminate almost every substance. It must ever be borne in mind that these powerful mineral salts are very violent agents, and must be used in very dilute form, and with great caution. Never venture to apply any of the mineral salts where they will fall upon the bedding or feed of animals. Mr. Pennington finds that the burning of sulphur will not destroy bacteria, and therefore condemns the use of any such means, as well as all the so-called germicides which by experiment have proved to be less effective than the hyposulphite of mercury and the corrosive sublimate.

These mineral salts must not be used for injections in the treatment of any disease unless further diluted.

If your walls are tinted with "alabastine" once in two or three years, a mild blue color, they will be very pleasant for the eyes of animals, a cheap and tasty finish for a brown wall. If not, apply lime whitewash semi-annually.

The agents that destroy every form of disease germs in the air, in all discharges, and in the walls of buildings, are the only true disinfectants. The number of these is very limited. For ordinary use the HYPOSULPHITE OF MERCURY is probably the best. Prepare a solution in the proportion of $\frac{1}{1000}$th in water, or sixty (60) grains of the hyposulphite to one gallon of the latter, and sprinkle it in the air and upon the walls of the building, and apply to all the fetid excretions of diseased organs.

The chlorine gas method of Professor Doremus may be adopted wherever there has been infection of *pleuro-pneumonia* and the *Texas fever*. The authorities should see that this method of disinfection is employed, and a competent chemist given charge of the work.

Caution: These germicides are fatal poisons to every living organism, and should be used intelligently in every instance, knowing that chlorine gas is deadly if inhaled, and the mercurial salts unsafe to be taken into the stomach of any animal except in a smaller quantity than used above. USE NO VESSEL CONTAINING THEM FOR ANY OTHER PURPOSE WHATSOEVER.

HYPOCHLORITE OF SODA.*

Hypochlorite of soda may be used as a germicide, and can be safely applied to ulcers and putrid eruptions, in dilution of 1 to 60 of water, or used as an injection

* Reed & Carnrick.

for diseased mucous membranes, 1 to 100 of water. As a germicide apply to all infectious matter 1 to 16.

DEODORIZERS.

For every offensive odor in the stable seek out and remove the cause. Keep the air as sweet as a pasture-field. There is no better deodorizer than a hot roasting pan of *coffee-beans* carried through the building so as to freely give the fumes of parched coffee, while the grains also act as an absorbent. Among the commercial compounds *Listerine* will prove useful and pleasant as a deodorizer for the hands after operations.

GENERAL SUMMARY FOR DISINFECTION.

A radical discrimination must be made between deodorizers, disinfectants, and germicides.

Use each of these for special purposes in the stable, just as in the human dwelling and hospital.

Listerine, a fragrant antiseptic mixture, may be found useful in deodorizing the foul discharges that follow abortion, parturition, and those excretions accompanying various diseases. It is a mixture of oils and extracts from Thyme, Eucalyptus, Baptisia, Gaultheria and Mentha arvensis. Each drachm contains two grains of refined benzo-boracic acid.

The Listerine when well diluted is useful as an injection where the vaginal discharges are very fetid. It is useful for deodorizing when a thorough washing with hot water and soap fails to remove offensive odors.

SUMMARY OF PRACTICAL USE OF DISINFECTANTS.

FOR EXCRETIONS.

1. Chloride of Mercury in solution, 1 to 500.
2. Hyposulphite of Mercury in solution, 1 to 500.

FOR INFECTED CLOTHS OR SPONGES.

1. Destruction by fire if of little value. The combustion must be total and complete.
2. Boiling one hour.
3. Immersion in a solution of Chloride of Mercury of the strength of 1 to 1000 four hours.

FOR CLOTHING OF ATTENDANTS.

1. Exposure to dry heat at a temperature of 230° F. for two hours.
2. Destruction by fire if of little value and badly infected with contagion spores.

3. Immersion in boiling water for one hour.

4. Immersion in solution of Chloride of Mercury of 1 to 2000 for four hours.

FOR THE PERSON.

1. Wash the hands and surface of the body in a ten per cent. solution of Chlorinated Soda.

2. Wash the hands in a solution of Chloride of Mercury or Hyposulphite of Mercury 1 to 1000.

FOR THE WALLS OF THE STABLE.

1. Wash all surfaces, while occupied, with a solution of Chloride of Mercury of 1 to 1000.

2. When vacated use Prof. Doremus's method with Chlorine Gas.

3. For instruments and all metallic surfaces a solution of the Hyposulphite of Mercury of 1 to 1000.

PART THIRD.

THE DAIRY.

THE DAIRY BUILDING.

The plan of a dairy will vary according to its purposes, whether it is for canning or bottling milk for market, for butter-making, for canning or bottling sweat cream, or for a fancy cheese dairy. The essentials of a good dairy building are the means for controlling the temperature of the milk and cream to any desired degree in winter and summer, ample ventilation, sufficient north light, abundant supply of hot and cold water, an ice-house, means of cleanliness, absolute exclusion and prevention of all offensive odors, exclusion of flies and other insects, exclusion of dust, together with all the best-improved machinery used in every process.

The building should be conveniently arranged for work and as compact as possible, and all the attendants held responsible for a certain share in the routine, which must always be perfectly performed, and the quality of product of the highest excellence.

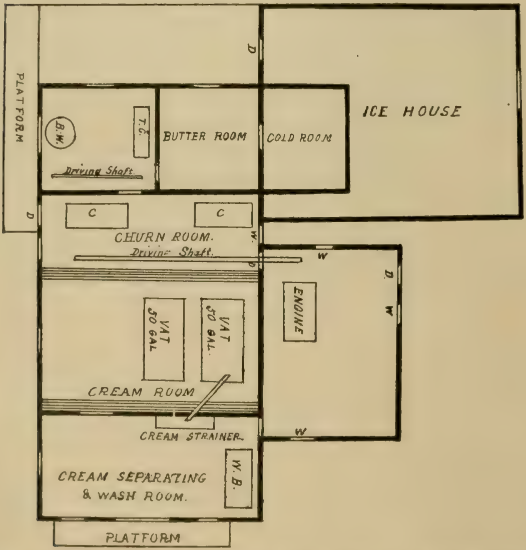
There is an ever-increasing class of discriminating customers who are willing to pay an increased price for articles of rare quality, purity and absolute cleanliness, especially when furnished in attractive form, and of such unvarying sameness that the brand of the dairy shall always justify confidence.

SYSTEM.

The system in every dairy, large or small, should be thoroughly organized and complete. Whether it be the little spring-house with its primitive methods or the large establishment equipped with steam-engine, separator, ice-water tanks, elevators, rotary churns, and all the apparatus for making fancy butter pats, or bottling sweet cream, or making fancy cheeses, every person employed should be thoroughly familiar with his work and all its requirements, and held responsible for all the duties of his department or share in the work. Each milker must be an expert and held strictly accountable for the healthy condition of the cows' udders and the cleanliness of the milk. The feeder should be held responsible for the condition and appetite and productive power of the cows. The man who has charge of the milk-room should be held responsible for the cleanliness of all the utensils, the temperature of the

air, milk and cream; the engineer responsible for all the machinery and the heating of the building and stable; the man in charge of the separator responsible for the churn, shafting and other utensils; the dairy woman responsible for the washing, working and salting, moulding and printing of the butter. The men employed should all wear clean white overalls, frocks and aprons, and spotless cleanliness and purity must be the rule in every department. No loud talking, no profanity, no smoking or drinking; but everywhere sweetness, which must be encouraged by an abundant supply of steam, hot and cold water, for all purposes of cleanliness. Vessels are to be scalded with steam, rinsed in hot and cold water, the floors to be kept polished, and all metal-work bright and shining, the stables and the dairy as clean as a parlor at all times.

PLAN OF DAIRY FOR FIFTY COWS.



General plan of Dairy. Main dairy building, 16 × 32 feet. Ice-house, 16 × 20 feet. Engine-room 12 × 14 feet.

WESTPHALIA 24,384.

AT 4 YEARS OLD.

Welcome Type.

CREAM COTTAGE HERD.

J. S. ROGERS, PATERSON, NEW JERSEY.

ROOMS.

Main part divided into five rooms. Receiving-room, 7×16 feet, with slanting floor and drain. Can be used for receiving milk, a cabinet creamery or centrifuge, and for washing-pails, cans and utensils. The floor elevated four feet above sills, or built upon terraced ground and paved with concrete.

Cream-room, 10×16 feet, with slanting floor draining on to churn-room floor; used as a cream tempering-room; floor elevated two feet above sills or terraced ground. Two fifty-gallon cream vats.

Churn-room, 8×16 feet, has floors on a level with sills, or terraced ground, slanting toward cream-room, with drain at the junction of the elevated floor of the cream-room.

Butter-room, 7×16 feet; slanting floor drain connects with main drain in churn-room.

Cold-room, 7×8 feet, is built in ice-house and is covered with galvanized iron and surrounded with ice; this is for butter storage.

CONSTRUCTION OF DAIRY.

The dairy is built in the following manner:

Sills, 6×8, on stone, brick or concrete foundation; joist for elevated floor, 2×8, spiked to studs supported in centre with 4×6 timbers, shored up on pillars. Ends shored up with 2×4 studs; outside walls 2×4 studding, twelve feet long. Upon outside of studs nail rough inch boards; cover them with building paper; fur on it with inch strips; side with drop-siding, or stock boards stripped; on inside of studs rough-board, paper; fur out with inch strips, and ceil with fence flooring; ceiling overhead with fence flooring; floor laid with clear flooring or terraced with concrete; partitions ceiled on studs set flatwise, on both sides, leaving a two-inch air-space. Cream and churn-rooms can be in one, or partitioned, as desired.

To enlarge the capacity of the dairy add to the width of the main building. The raised or terraced floors are constructed for convenience in handling cream; cream strained and carried into vats, through conductor pipes; also from vats to churns, through conductor pipe, saving all the lifting of cream in cans, and rendering it possible for one man to do one half more work than in a dairy without terraced floors.

DAIRY DRAINAGE—PLAN OF DAIRY.

To avoid dampness and mould the first requisite in the structure of the dairy is thorough drainage, combined with provision for thorough ventilation and abundance of light.

The key to good drainage is a good foundation. Select a site where the soil is sandy and having a good fall.

Build the foundations of good cement wall laid below the frost line, and allow a

basement four feet deep. Lay drains two feet below the foundation, even in the dryest soil.

The basement floor is then built in terraces, according to following plan: laid of broken stone and concrete three inches thick, and coated with cement one inch thick, made of one part hydraulic cement and three parts of sand. The foundation walls need coating without as high as the ground surface with hot asphalt, and a space twelve inches wide upon the outside, filled in with broken stone and topped with flagging, to keep out the rain. The windows of the milk, cream, and butter apartments should all be double and face northward. The system of ventilation should be independent of the windows, as the latter ought always to be closed. Admit air at night or by subterranean tunnel. *Always use a hygrometer.* Three pounds of fresh lime will absorb one pound of water, and the hygrometer will measure the efficiency of this extractor.

MILK.

Milk, the special secretion of all female animals for the sustenance of their young, has been wonderfully increased in quantity and improved in quality in the cow by the skill of man, so as to become one of the most important articles of human subsistence. It has the appearance of an opaque, creamy white fluid, but is in reality a turbid, almost transparent serum, with numerous fat globules floating therein which create an optical illusion of opacity.

THE UDDER.

The udder of the cow often attains an immense size, rendering the cow the greatest food-producer in the world.

The udder is divided into four, rarely six, distinct compartments or quarters. The milk is secreted from glandular organs whose structure is very simple. Each gland is composed of several separate glandules, which are connected by certain fibrous or binding structures in such a way as to admit of quite a degree of mobility of its parts, one upon another; and the glandules are also connected by the branching of the milk-tubes, which intermingle. The tubes are abundantly supplied with valves. The terminal ducts contained in the teat are straight but of variable size, and their orifices are narrower than the tubes. At the base of the teat these tubes dilate into reservoirs, which extend some distance into the gland. From each of these reservoirs commence several branches of the milk-bearing tubes, each of which speedily subdivides into smaller ones; and these again branch until their size is very minute and their extent vastly increased. These, like the reservoirs and terminal ducts, are composed of a fibrous coat lined with a mucous membrane; the latter is very vascular, and forms a secretion of itself when the milk ceases to be secreted.

The smaller divisions of the milk-tubes proceed to distinct minute lobules in each

glandule. These milk-tubes terminate in follicles or minute cups, which are lined by the same membrane as the ducts.

The arteries which supply the glandules with blood become very large during lactation, and their divisions are very minutely spread upon the follicles. From the blood which they convey the milk is secreted in some way not yet understood, and poured into the follicles, and thence into the tubes, ducts and reservoirs, distending the udder, when fully active, in about eight hours to its full capacity. The reservoir at the base of the teat is about the size of a large egg, and is separated from a smaller reservoir in the teat by a membranous valve. The lower orifice of the teat is closed by a circular elastic muscle, the elasticity of which varies greatly in easy or hard milkers. The udder is supported by a very large and strong tendon leading down from the muscles of the belly, between the four great lobular divisions of the udder. This tendon is subdivided into a multitude of branches, which enable the vessel to sustain an enormous weight. In some cows these ligaments are deficient in strength and by stretching allow the udder to sag. (See portrait of Eurotas 2454.)

ELEMENTS OF MILK.

The milk secretion is shown to be an emulsion of fat globules suspended in water, with a mixture of fixed salts, sugar of milk, and a peculiar substance, casein.

The fat globules are formed in the follicles of the milk glands, and vary in size from the most minute, $\frac{1}{4000}$th of an inch, to medium, about $\frac{1}{2700}$th of an inch, and largest, $\frac{1}{1500}$th of an inch in diameter. Their size and quality, according to Dr. Sturtevant, vary greatly in different breeds and according to feed and the health of the animal. The Jersey cow has a very large cream globule; the Dutch, or Holstein-Friesian, has exceedingly minute cream globules, and small in amount; the Ayrshire a mixture of medium and small, also in moderate amount. Bran is said to minify them and maize meal to increase their size.

The large globules rise first in the form of cream, the smallest globules last, the former churning easily, and yielding butter of the finest grain and quality.

Milk is the only secretion of the body and the only article supplied by nature for the young combining the three elements required for human food—protein, fat and sugar.

Of all secreted fluids milk is most nearly allied to blood in its composition.

The chemical composition of milk considered in its relation to human food, especially the nutrition of children, is a most important study, not alone for the physician, but for the practical dairyman and farmer.

The first question, in the study of the quality of milk pertaining to different races or breeds, is the amount and proportion of the solid constituents. Water, the most abundant element in milk, is simply a vehicle for the suspension and dilution of the solids, and constitutes an average of seven eighths of the total milk.

Butter is the milk fat mixed with about ten to fifteen per cent. of water and one half per cent. of the fixed salts and casein with what chloride of sodium or common salt is used in the making.

Cheese is the casein and albumen of the milk in combination with a portion or all of the fat, the fixed salts and a variable quantity of water.

Buttermilk consists of the water of milk with a large part of the casein and a remnant of the fat.

Whey is the water of milk with the chief part of the milk-sugar, and small portions of the other solids.

The value of milk depends on the amount of solids it contains.

In estimating the excellence of a breed of cattle we must consider the quantity of milk, the proportion of water and solids, the relative amount of the different solids, the period of lactation and gestation, the kind and amount of food, the weather, the climate, the health, the age, and any other conditions that may affect the proportion of the ingredients. The eye is unable to judge by the color of the milk or the bulk of cream of its richness in composition. The test by chemical analysis is the absolutely conclusive means of ascertaining the quality of milk.

The specific gravity test is an aid in judging of the purity of milk, and is made by an instrument called the lactodensimeter, which consists of a glass spindle having a slender stem marked with a scale of degrees and a bulb containing mercury; this sinks in the milk and can be read with accuracy at once. Milk is a little heavier than water. A vessel holding one thousand grains of water will hold from one thousand and twenty-nine to one thousand and thirty-six grains of milk.

Milk is made heavier than water by its casein, sugar and salts, and lighter than water by its cream, so that its specific gravity is diminished by adding water and increased by taking away cream.

If milk be both watered and skimmed it may show a nearly normal specific gravity, but the chemical test will ascertain the exact composition of the liquid.

Analysis of Milk by Haidleu, France.

FRESH COW'S MILK.

Water		87.300
Fat		3.000
Casein		4.820
Milk-Sugar		4.390
Fixed Salts.	Phosphate of Lime	.231
	Phosphate of Magnesia	.042
	Phosphate of Iron	.007
	Chloride of Potash	.144
	Chloride of Soda	.024
	Soda combined with Casein	.042

The forty-two-thousandths of one per cent of soda combined with casein is sufficient to render new milk slightly alkaline. On standing it very soon develops lactic acid, an acid that never exists in the fresh condition. The soda holds the casein in solution, which gives casein power to take up and retain a quantity of phosphate of lime.

The average weight of milk is 2.15 pounds per wine quart.

Milk Analysis by D. W. Voyles, M.D.

- Milk..
  - Cream...
    - Butter......
      - Solid Fats....
        - Margarine...
          - Glycerine.
          - Margaric Acid.
        - Stearine.....
          - Glycerine.
          - Stearic Acid.
      - Liquid Fats..
        - Oleine........
          - Glycerine.
          - Oleic Acid.
        - Butyrine.
    - Buttermilk..
      - Caseum......
        - Glycerine.
        - Butyric, Capric and Caprylic Acids.
      - Whey......
        - Milk Sugar.
        - Osmozene.
        - Salts.......
          - Alkaline and Earthy Lactates and Phosphates.
          - Alkaline Sulphates and Phosphates.
          - Ferruginous Phosphates.
  - Skim Milk.
    - Caseum, coagulable by Rennet, as above.
    - Zeiger, coagulable by Acetic Acid.
    - Serum, or Whey, as above.

VARIATIONS IN MILK OF BREEDS OF CATTLE.

Milk varies so greatly in its composition in different breeds of cattle that it will furnish many useful lessons, if breeders will make systematic chemical tests of rich cows. Numerous chemical tests have been reported which are suggestive and instructive, although incomplete in a majority of cases. In a chemical test the breed should always be stated and the date, with the following heads: Specific Gravity, Water, Total Solids; Fat, Casein, Albumen, Sugar, Fixed Salts; Age and Weight of Cow, Daily Ration, Weight of Daily Yield of Milk; Time from Calving; How Long Pregnant; Weather, and Other Incidents; also state whether there are two or three daily milkings.

The elements of milk vary widely not only in breeds, but in the individuals of the same breed, in one cow at various times, and in the four separate quarters of the udder of the same cow. Each breed has its general peculiarities of quality in milk

secretion. Jersey milk differs from that of all other breeds, as one variety of peach, apple or pear differs from all others in having a fixed individual character. There is a wide difference in quality between the Ansault, the Bose, and the Sheldon pears, but they are all excellent; there is a wider difference between all these and the "Choke" pear. There is as wide a difference between the milk of the Jersey and some of the coarse breeds of cattle, a difference that is much wider than the art of the chemist can show, because there are qualities too delicate to be apprehended by the chemist's crucible.

There is not alone a great variation in the combinations of elements, and the proportions of fat, casein, sugar and mineral matter, but the inherent quality of all these parts is more or less varied. For the milk is affected by the character of the animal, its odor and taste being varied much; also the kind of food used makes differences so great as to produce results affecting the health and life of a child, or even a young animal fed thereon. The study of milk is deserving of more attention in minute details because of its importance in relation to the artificial feeding of children. The mineral substances of the milk also vary greatly in proportion and possibly in the quality of their combinations. Here are combinations formed from phosphoric acid, chlorine, the oxides of potassium, calcium, iron, soda, magnesia and sulphur. These mostly exist in the form of phosphates, of which the most important is the phosphate of lime, the latter constituting about half the ash of milk. Milk contains several gases in small amount, including a small amount of carbonic acid, oxygen and nitrogen, which make up about .002 of the bulk of new milk, but escape by exposure. Cow's milk also contains a small amount of pepsin, which aids in its digestion and in cheese-making. A temperature of 145° destroys the pepsin and greatly injures the milk. Coloring matter and various volatile oils give character to the milk.

Jersey cows produce a milk which differs greatly from almost all other breeds. By the reports of chemical analysis and by the actual tests of milk as food, and in the production of butter and cheese, the Jersey milk is unrivalled in quality and richness by that of any other breed of cattle in the world.

The following comparative analyses show the chemical variations between the milk of Jerseys and other breeds:

Analyses of Milk made in 1884 by Professor H. W. Smith, Chemist for Houghton Farm, Mountainville, N. Y., and contributed for this work by Major Henry E Alvord, Manager:

MILK OF JERSEYS—HOUGHTON FARM HERD.

Mixed milk of herd of twenty-eight cows, morning and evening, in July, 1884:

	Water.	Total Solids.	Fat.	Casein.	Sugar.
Morning	85.3	14.7	5.5	3.9	4.3
Evening	85.6	14.4	4.8	3.9	4.8

Milk from fourteen selected cows :

	Water.	Total Solids.	Fat.	Casein.	Sugar.
Extreme	84.1	15.9	6.6	3.9	6.2
Extreme	86.3	13.7	4.3	2.7	4.3
Average	85.6	14.4	4.93	3.3	5.1

Jersey Tests.

MILK OF COW MAID OF FIVE OAKS 7178, EIGHT YEARS OLD.

Water.	Total Solids.	Fat.	Casein.	Sugar.
85.7	14.30	5.20	3.80	5.0

Date, July, 1884. Last calf, April, 1884. In calf thirty days. Milk yield day of sampling, 25 lbs. 12 oz.

MILK OF JERSEY HEIFER VALLEY LASS 20,050. BORN NOVEMBER 10, 1882.

Water.	Total Solids.	Fat.	Casein.	Sugar.
83.18	16.82	7.12	4.20	4.1

MILK OF RAMETTE 20,051. BORN DECEMBER 18, 1882.

Water.	Total Solids.	Fat.	Casein.	Sugar.
87.80	12.20	4.57	3.90	4.3

These two heifers, daughters of the Jersey bull Ramapo 4679, came into milk while in pasture, July, 1884, neither having had service by a bull.

MILK OF HOLSTEINS, MEADOWBROOK HERD.

JOHN MITCHELL, PROPRIETOR, ORANGE CO.

Mixed milk of herd July, 1884, noon milking, milked thrice daily:

Water.	Total Solids.	Fat.	Casein.	Sugar.
88.0	12.0	4.3	2.6	4.1

Milk of eight selected cows :

	Water.	Total Solids.	Fat.	Casein.	Sugar.
Extreme	87.20	12.8	4.0	3.8	5.8
Extreme	88.50	11.5	3.3	1.5	4.7
Average	87.70	12.3	3.6	2.8	4.3

HOLSTEIN COW JAMAICA 1336 H. H. B. BORN 1881.

Total Solids.	Fat.	Casein.	Sugar.
12.6	3.5	3.8	4.7.

July, 1884; had calf early in spring; in calf; milk yield day of sampling, noon milking, 41 lbs.

Correct. October, 1884. From Records of Experimental Department of Houghton Farm; Henry E. Alvord, Manager.

Milk analyses from Jersey cows at the New York State Agricultural Experiment Station, by S. Moulten Babcock, A.M., Ph.D., Chemist (*Report for year* 1882):

"Four Jersey cows arrived at the station November 30th, after a two days' trip. Three of these were giving milk, and these were milked in the morning, and were not again milked until the evening, and the mixed milk was at once carefully sampled for purposes of analysis. We had, hence, the milk of fatigued and harassed cows. It would scarcely answer to generalize from one case, yet we would call attention to the general belief that harassing of cows diminishes the fat of the milk. The results of the analysis are phenomenal in their character."

MIXED EVENING MILK FROM THREE FATIGUED JERSEY COWS.

1. Specific Gravity	1.0226
2. Per cent. Cream after fifteen hours	30.30
3. Fat	10.50
4. Casein	3.09
5. Albumen	.70
6. Sugar	3.23
7. Ash	.59
8. Loss	.62
Total Solids	18.73
Water	81.27
	100.00
Per cent. nitrogen by combustion	0.60

TOTAL SOLIDS.

"In the milk from fatigued cows the solids were largely increased, the increase being wholly due to increased amount of fat, the other solids being lessened. More influence must be attributed to insufficient food and deprivation of water than to any mechanical effect of the journey." (Report of 1883.)

"Commencing January 2d, 1883, and extending over a period of forty-seven days, daily examinations of the milk of four Jersey cows were made, for the purpose of ascertaining the influence of different rations on the quantity and quality of the milk. The composition of the milk from the herd of four Jersey cows kept at the station as determined by analyses made during the feeding experiments is given below."

SUMMARY OF JERSEY ANALYSES.

Elements.	Highest.	Lowest.	Average.
Specific Gravity	1.0336	1.0296	1.0315
Cream	17.5	10.	13.80
Solids	15.90	13.26	14.47
Fat	6.02	4.47	5.09
Casein	3.93	3.25	3.57
Sugar	5.56	4.64	5.15
Ash	.74	.56	.67

Two analyses of Milk from Holstein cows belonging to the herd of G. S. Miller, Peterboro, N. Y.:

Elements.	Milk from Holstein Cow "Nannie Smith."	Milk from Holstein Cow "Gem."
Specific Gravity	1.0319	1.0305
Solids	12.11	13.61
Fat	3.40	4.41
Casein and Albumen	2.47	3.10
Sugar	5.69	5.34
Ash	.55	.76

ABSTRACT FROM REPORT.

In the experiments with the four Jerseys they were fed, preceding the analysis, four pounds each of wheat bran and four pounds corn meal, with hay *ad libitum*, and the four cows averaged in weight, from December 10th to January 1st, seven hundred and nine pounds.

From January 2d to 7th each cow received twenty pounds hay, eight pounds corn meal, and eight pounds of shorts, and averaged in weight seven hundred and five pounds, and the average solids in the milk was 14.52 per cent.

January 8th to 14th each cow had twenty pounds hay, and, with the exception of three days, sixteen pounds of shorts, the three days fourteen pounds of shorts and fifteen pounds hay; the cows averaged seven hundred and twenty-two pounds in weight, and gave their highest yield in solids and in butter. Highest solids, 15.90 per cent.; average, 15.05.

January 15th to 19th each cow had fifteen pounds hay and twelve pounds gluten meal, and averaged seven hundred and thirteen pounds. The yield of milk was greatest, but the solids were 14.05 per cent.

January 20th to 25th each cow had fifteen pounds of hay and ten pounds corn meal, and weighed six hundred and ninety-seven pounds. The solids averaged 14.27 per cent.

January 26th to 28th each cow had five pounds hay and four pounds corn meal, four pounds shorts and ten pounds ensilage. The average weight of the cows was six hundred and ninety-seven pounds. The solids averaged 14.61 per cent.

January 29th to 31st the feed was five pounds hay, four pounds corn meal, and twenty pounds ensilage to each cow. Their weight fell to six hundred and ninety-one pounds, the milk greatly lessened in quality, and the solids averaged 14.83 per cent.

February 1st to 3d each cow was fed four pounds corn meal and thirty pounds ensilage, with a falling to six hundred and eighty pounds in average weight, a lessening of milk, and an average of 14.25 per cent of solids.

From February 4th to 11th each cow had an average feed of fifty-five pounds of ensilage. They gave the lowest yield of milk during the experiment, 9.41 pounds daily; the cows averaged six hundred and ninety-three pounds in weight, and the percentage of milk solids was 14.23.

From February 12th to 18th each cow had fifteen pounds hay, four pounds corn meal, and four pounds shorts. The average weight was six hundred and eighty-five pounds, and the percentage of solids 14.27, with an increase to 10.59 pounds of milk daily.

ANALYSES MADE AT THE NEW JERSEY STATION, 1880.

Elements.	Jersey.	Native.	Ayrshire.
	6 Cows.	6 Cows.	5 Cows.
Water	85.28	86.43	87.15
Solids	14.72	13.57	12.85
Casein	3.67	3.34	3.20
Fat	5.21	4.49	4.33
Sugar	4.93	4.82	4.60
Ash	.91	.92	.72
Daily yield	21 lbs. 3 oz	22 lbs. 9 oz.	21 lbs. 4 oz.

ANALYSES AT THE CONNECTICUT STATION.*

ELEMENTS.	Guernseys.	Guernsey Cow Ceres.	Ayrshire.
	3 Cows 7 mos. from Calf.	8½ mos. from Calf.	3 Cows.
Specific Gravity	1.0337	1.0368	
Water	85.49	82.94	87.87
Solids	14.84	17.06	12.16
Casein	4.12	4.60	3.12
Fat	4.68	6.74	3.59
Sugar	4.44	4.52	4.69
Ash	1.08	1.20	.76

MILK OF DUTCH COWS.†

Dr. Schmoeger (Milch-Zeitung, 1881) gives the results of extended observations on the yield and quality of milk from a herd of forty-five Dutch cattle in Proskau, from October 15th, 1878, to March 31st, 1881. The average yield per head from October, 1878, to October, 1879, was two thousand eight hundred and sixty-four quarts; from October, 1879, to April, 1880, was one thousand four hundred and eighteen quarts; and from April, 1880, to April, 1881, was two thousand nine hundred and seventy-three quarts.

The cows were milked three times daily: at 4 and 11 A.M. and 6 P.M. The observations on the *quality* of the milk are as follows:

		Morning.	Noon.	Evening.
Specific Gravity.	Minimum	1.0292	1.0291	1.0299
	Maximum	1.0340	1.0340	1.0345
	Average	1.0320	1.0312	1.0319
		Average.	Average.	Average.
Solids		11.31	11.85	11.77
Fat		2.79	3.41	3.26

AYRSHIRE MILK.‡

Analysis of milk from Ayrshire cow. Evening milk, August 6th, 1876:

1. Right forward teat, yield .... 2 lbs.
2. Left forward teat, yield .... 1¼ "
3. Right rear teat, yield .... 1½ "
4. Left rear teat, yield .... 1¼ "

* From Connecticut Annual Report, 1882. † Report of Connecticut Experiment Station, 1882.
‡ Dr. Sturtevant, in U. S. Agricultural Report, 1880.

ELEMENTS.	No. 1.	No. 2.	No. 3.	No. 4.
Specific Gravity	1.025	1.024	1.026	1.028
Fat	5.59	4.43	4.39	3.84
Sugar	4.09	2.18	3.44	4.20
Casein and Albumen.....	4.48	6.58	5.00	5.59
Ash	.68	.61	.66	.67
Total Solids............	14.84	13.80	13.49	14.30
Water..................	85.16	86.20	86.51	85.70

Cow eleven years old; seven months from calf. Feed, pasture, fodder-corn, and six quarts of shorts.

Milk of Ayrshire heifer two and one half years old; six months from calving; stabled and fed on corn fodder, hay and oatmeal.

1. Right forward teat, yield.. $1\frac{3}{8}$ lbs.
2. Left forward teat, yield.. $1\frac{3}{8}$ "
3. Right hind teat, yield.. $1\frac{1}{2}$ "
4. Left rear teat, yield.. $1\frac{5}{8}$ "

ELEMENTS.	No. 1.	No. 2.	No. 3.	No. 4.
Specific Gravity.........	1.032	1.0316	1.030	1.0315
Cream, per cent.........	14	11	13	10
Sugar..................	4.90	5.00	4.72	4.88
Casein and Albumen....	3.53	3.42	3.61	3.48
Ash....................	.59	.57	.61	.64
Fat....................	3.32	3.00	2.73	2.13
Total Solids............	12.34	11.99	11.67	11.13
Water..................	87.66	88.01	88.33	88.87

S. P. SHARPLES, Chemist.

The average for the two Ayrshires is as follows:

Specific Gravity.	Water.	Solids.	Casein.	Fat.	Sugar.	Ash.
1.028	87.05	12.94	4.41	3.67	4.17	.62

EFFECT OF WORRY UPON QUALITY OF MILK.*

A pet cow, breed not stated, was purchased, and turned in with the herd of the new owner, and, although represented to be a good milker, the quality was poor and almost creamless. On May 14th, 1883, a sample of her milk was analyzed at the Connecticut Station, with the following results:

TESTS OF MILK.

Specific Gravity	1.031
Solids	11.28
Fat	2.16

At later dates:

	Aug. 1st, 1883.	Jan. 15th, 1884.
Water	87.50	84.92
Solids	12.50	15.08
Casein and Albumen	2.81	3.34
Fat	3.94	5.54

MILK ANALYSIS IN PLEURO-PNEUMONIA.

From United States Agricultural Report for 1878 is derived this analysis of milk from a grade Shorthorn cow suffering with pleuro-pneumonia:

Specific Gravity at 59° Fahr.	1.033
Water	86.42
Fat	2.28
Solids not fat	11.30
Casein	4.60
Albumen	1.23
Sugar	4.63
Ash (insoluble) .626 / Ash (soluble) .213	.84

TESTS OF MILK.

	Jersey Cow Honey.	Holstein Cow Itzehoe.
	(Both owned by W. S. Tilton, Mass.)	
Water	83.55	85.80
Total Solids	16.45	14.20
Fat	5.24	3.94
Casein and Sugar	10.44	9.60
Mineral Salts	.77	.66
Per cent. Cream by volume	25.75	15.00

* Annual Report Connecticut Agricultural Experiment Station, 1883. Abstract.

Analysis of six samples of Dutch (or Holstein-Friesian) milk by Professor Voelcker, of London, England:

Water, 88.20.

Total Solids, 11.80.

Fat, 2.90.

COMPARATIVE CHEMICAL TESTS OF MILK OF DIFFERENT BREEDS.

Name of Breed.	Total Solids.
Jersey, one cow	*21.43
Jersey, three cows	*18.73
Guernsey, one cow	17.15
Jersey, one cow	16.23
Jersey, one heifer (virgin)	16.82
Jersey, one cow	16.59
Jersey, one cow	16.33
Ayrshire, one cow	14.76
Devon, one cow	14.75
Native, six cows	13.57
Ayrshire, seven cows	12.85
Short-horn, one cow	12.96
Dutch (Holstein), one cow	12.60
Dutch, forty-five cows for two and a half years' test	11.77

Breed.	Per cent. of Fat.
Jersey, one cow	12.53
Jersey, three cows	10.50
Jersey, one cow	8.58
Jersey, one virgin heifer	7.12
Guernsey, one cow	6.74
Jersey, one cow	6.59
Devon, one cow	5.28
Ayrshire, one cow	4.96
Swiss (highest)	4.50
Native, six cows	4.49
Shorthorn, one cow	3.85
Dutch (Holstein), one cow	3.50
Dutch or Holstein, forty-five cows, two and a half years' test	3.26

* New York State Experiment Station.

Breed.	Casein.
Jersey, one cow	4.90
Jersey, one virgin heifer	4.20
Guernsey, one cow	4.60
Guernsey, three cows	4.12
Jersey, four cows	3.93
Jersey, three cows	3.61
Jersey, six cows	3.67
Ayrshire, one very extra cow	3.26
Ayrshire, five cows	3.20
Dutch (Holstein), one very extra cow	2.78

RELATIVE RICHNESS OF MILK IN BREEDS.

As far as I am able to determine by the limited number and incomplete character of milk analyses yet made, the various breeds of cows deserve to rank for richness in solids and utility for the dairy, whether as butter, cheese, cream, or milch cows, as follows:

1. Jersey (always First).
2. Guernsey.
3. Angler.
4. Red Poll.
5. Devon.
6. American Red (Native).
7. Swiss.
8. Ayrshire.
9. Shorthorn.
10. Dutch (or Holstein Friesian).

"An experiment with two Jersey and two Holstein cows required forty-eight pounds of food for Holsteins and twenty-four pounds for Jerseys to produce a pound of butter."

As corroborative evidence that the above tabulation is approximately correct in all its parts and as a whole essentially so, I quote from an article written by Mr. Valancey E. Fuller, in the *Country Gentleman*, November 26th, 1885, in which he says: "I now desire to call attention to a series of public tests at the Dominion Exhibition in London, Ontario, in September last. It was the boast of the Holstein breeders that they had, in point of numbers (about two hundred, including heifers and young bulls) a grand representative display; and, as compared to Jerseys, they were three to one.

"Tests were made by Professors Brown and Barre for milk, butter and cheese

combined, according to the plan and count of points adopted in England and Scotland at the dairy fairs, as follow:

"'1. *Weight of milk.* One point (count) is allowed for every pound given in twenty-four hours. 2. *Quantity of butter.* In England the standard is three pounds to every one hundred pounds of milk. In Canada the standard is 3.5 pounds to every one hundred pounds of milk. Add or deduct ten points (counts) for every one above or below. 3. *Cheese curd per one hundred pounds of milk.* Allow one point (count) for every pound. 4. *Time since calving.* Add one point (count) for every ten days.'

"All the cows were judged by the same count of points, and under similar circumstances, but in different classes; eight Holsteins entered in their class, three Ayrshires in theirs; two grade Shorthorns in theirs, and two Jerseys in their class.

"The Jersey cow Rose of Eden led them all, making the largest score ever made by any cow of any breed in the world for a similar contest—namely, one hundred and nine points [counts] for butter, milk and cheese combined.

"An Ayrshire was second (83.85); a grade Shorthorn third (81.52); the other Jersey fourth (78.10); Ayrshire fifth (68.27); Holstein sixth (64.29); Holstein seventh (59.07); grade Shorthorn eighth (55.07); Holstein ninth, tenth, eleventh, twelfth, fourteenth, fifteenth, and sixteenth, and Ayrshire thirteenth (49.42).

"The Jersey excelled the highest combined score of the Ayrshire twenty-one points [counts] and the highest of the Holsteins by forty-five points [counts].

"The lowest Jersey excelled the highest Holstein by over thirteen points [counts].

"The averages of each breed were as follow:

Breed.	Milk in 24 hours.	Butter per 100 lbs. of Milk.	Wet Cheese Curd per 100 lbs. of Milk.
Jersey	25.56	7.28	20.30
Ayrshire	24.51	4.24	22.70
Holstein	32.19	2.98	16.59
Grade Shorthorn	35.52	3.36	20.62

"The highest milk record is that of a grade Shorthorn, 46.80 pounds. The best milk record of Holstein is 37.60 pounds, and the lowest 23.60 pounds. Highest and lowest Ayrshire, 29.50 pounds, and 18.12 pounds.

"Highest and lowest Jersey, twenty-seven pounds, and 24.12 pounds. Quantity of milk required to make one pound of butter: Jersey, less than fourteen pounds;

ROSE OF EDEN 13,437.

AT 6 YEARS OLD.

A Champion Prize Winner.

OAKLANDS HERD.

VALANCEY E. FULLER, HAMILTON, ONTARIO, CANADA.

Ayrshire, over twenty-three pounds; grade Shorthorn, over twenty-nine pounds; Holstein, over thirty-three pounds.

"Unfortunately the Holstein breeders did not enter into direct competition with other dairy breeds in a similar test under like rules at the Toronto Exhibition in the following week, and thus here no comparison can be made, but I may say that those competing ranked as follow: Jerseys first, second, third, fifth, sixth and seventh places (there were six Jerseys entered); Ayrshire fourth, ninth, and tenth; Devon eighth."

This evidence is cumulative. The Jersey is always the best, the Ayrshire uneven in quality, the Holstein always the poorest.

The Holstein approaches nearest to a hydrant, in the quality of her productions, of any living creature. The best thing for the Netherlanders and the American importers of this breed to do is to forthwith inaugurate an improvement by introducing to all their herds the best-bred American Jersey bulls, so that in six generations, when their cattle shall have become fullbred, $\frac{63}{64}$th Jersey and $\frac{1}{64}$th Holstein, they will be possessed of a breed of cattle from which to make selections that will astonish the world for productiveness and rich quality.

HUMAN MILK.

A comparative study of human milk and cow's milk is of great importance in the artificial feeding of young children. Some accounts state that "the casein of human milk is much less precipitable by acids than is that of the cow, very commonly resisting the action of the mineral acids and that of the acetic, but being always coagulated by rennet, though the curd is long in collecting." Others state that "rennet does not seem to act upon human milk unless an acid be also present." It obtains that one of the chief difficulties in the feeding of children with cow's milk is the character of the casein and its formation of a curd much denser than that of woman's milk. Of the many devices for correcting or overcoming the peculiar effects of the amount and the density of the bovine curd, the best is a proportional dilution with a solution of gelatine and milk sugar, adding a small quantity of rennet or lacto-rennetine.

The milk of women differs as much in different individuals of the same race as that of cows of the same breed.

The dilution for children should be made proportional according to the following analyses, regard being exercised to select milk according to era of calving and age of infant, and always from non-pregnant cows.

Analyses of Human Milk.

BY SIMON.—FOURTEEN ANALYSES FROM THE SAME WOMAN.

Elements.	Average.	Extreme.	Extreme.
Water	88.99	83.57	93.16
Solids	11.01	16.43	6.84
Fat	2.53	5.40	0.80
Casein	3.43	4.52	1.96
Sugar	4.82	6.24	3.92
Fixed Salts	0.23	0.27	0.16

The quantity of casein is least at the beginning of lactation, and gradually increases to a standard proportion.

Milk sugar is in greatest amount at the commencement of lactation, and gradually decreases. The amount of butter fat is the most variable constituent. The proportion of casein is increased by exercise, as in animals.

HUMAN MILK.

Elements.	Quoted by Tanner.				Würtz's Analysis.	Leeds' Analysis of Eighty Samples.		
	1. Blonde.	2. Brunette.	3.	Average.	Average.	Extreme.	Extreme.	Average.
Water	89.20	85.33	88.90	87.81	87.02	91.51	79.96	86.73
Solids	10.80	14.67	11.10	12.19	12.98	8.49	20.02	13.26
Sugar	5.85	7.12	4.36	5.78	7.05	5.40	7.92	6.94
Fat	3.55	5.48	2.69	3.90	4.06	2.11	6.89	4.13
Casein	1.00	1.62	3.92	2.18	1.67	0.85	4.86	2.00
Salts	0.40	0.45	0.13	0.33	0.20	0.13	0.37	0.20

JERSEY COWS AS MILKERS.

From a record by Dr. Sturtevant, published in United States Agricultural Report for 1880, the Jersey herd of Mr. Edward Burnett, Southborough, Mass., shows the following averages, which included all the cows in milk, with the young heifers, some of which calved toward the close of the year in which their first yield appears.

Years.	Deerfoot Herd. Qts. per Cow.
1873	2050
1874	2377
1875	2215
1876	2712
1877	2475
1878	2404
1879	2726
Average for seven years	2423

"DEERFOOT" HERD—INDIVIDUAL YIELDS.

YEAR.	Pink 3d.	Pink 4th.	Susie.	Mab.
	Quarts.	Quarts.	Quarts.	Quarts.
1873	2594	2076	1988	1950
1874	3118	2566	2298	2463
1875	3348	3143	2922	3028
1876	3922	3879	3476	3384
1877	3827	3895	3576	2991
1878	3660	2820	3495	2978
1879	3130	2210	4524	3935
Average for seven years..	3371	2941	3182	2933

The cow Süsie gave in her seventh year an average of 12.39 quarts for three hundred and sixty-five days.

Deerfoot Maid gave 3592 quarts in 1879.

Julia 3510 gave 3593 quarts in 1876.

Patty 2d of Deerfoot gave 3083 quarts in 1879.

Princess of Southborough gave 3043 quarts in 1879.

ECHO FARM HERD.

Records of "Echo Farm" Herd, Litchfield, Conn.

Filbert 3630 at five years old gave in eight months 8466½ pounds of milk, or more than eight times her weight.

Locust 3631 at six years old gave during August 1274 pounds of milk, and for

eleven months after calf gave 9528 pounds, and in the latter part of the twelfth month, on hay ration, while being forced dry, gave 8 pounds daily.

Nellie 131 at sixteen years old had not been dry in nine years, and gave in her fifteenth year 7412½ pounds of milk, equivalent to 3447 quarts.

Mel 3d 127 when eleven years old gave 7354½ pounds of milk. (Cherry 1887, her daughter, gave for Mr. Durand 44 pounds a day.)

Clemmy 450 when fourteen years of age gave 955 pounds of milk in one month.

Dash 3060 when eight years old gave 8453 pounds of milk; at nine years old 7848 pounds, and at ten years of age 8937½ pounds, or 4156 quarts.

Norton's Peggy 2811 when seven years old gave 8550 pounds of milk, and at nine years old 7782 pounds.

Viviane 6866 at ten years old gave 7271 pounds of milk.

Arawana Belle 3277 at eight years old gave 8060 pounds of milk in ten months.

Quakeress 1861 gave at nine years old 8414 pounds, or 3913 quarts.

Myrtilla 2898 at nine years old gave in less than five months 3556 pounds of milk.

Bud of Glastonbury 4652 at seven years old gave in five months twenty-two days 4081½ pounds of milk.

MILK OF FAMOUS BUTTER COWS.

Jersey Belle of Scituate 7828 when making her test of 705 pounds of butter in a year had ordinary pasture and two quarts of bran daily in summer, rowen hay and two quarts of bran in winter. She made a pound of butter from five and one half quarts of milk at the flush and from four quarts later in her season, thus giving from 20 to 21 quarts a day at the flush, and was never dry, yielding 25 pounds of milk ten hours before calving.

Mary Anne of St. Lambert 9770 when five years old produced, between calves, 8470 pounds 12¾ ounces of milk, which made 867 pounds 14¾ ounces of salted butter, and in her official test of seven days, when six years old, produced 36 pounds 12¼ ounces of salted butter from 245 pounds of milk, or a pound of butter from six and two thirds pounds of milk (three and one seventh quarts), an average daily yield of 35 pounds, or 16¼ quarts of milk. Her daily feed was withered clover pasture, from thirty-five to fifty quarts of grain, a small quantity of roots, cabbages, and a few apples, divided into from five to seven feeds.

Eurotas 2454, between two calves dropped within one year, yielded in 340 days 7525 pounds of milk, which made 778 pounds 1 ounce of butter ready for market.

Masena 25,732, between calves dropped a year and fifteen days apart, yielded in 376 days 9101 pounds of milk, which made 902 pounds 3 ounces of butter ready for market.

*Average Milk Yield of Houghton Farm Herd for One Year—Fifteen Cows, including Two Aged Cows and Three Undeveloped Heifers.**

Herd Book Number.	Lbs.	Oz.
7,177	6,077	14
7,178	6,505	4
7,280	6,081	5
7,281	5,131	11
7,283	5,647	13
9,127	6,151	8
12,560	4,901	1
12,574	4,611	..
12,575	5,062	9
12,578	6,176	15
14,432	5,600	02
14,992	5,048	14
14,993	6,899	8
——	6,560	3
——	7,207	8
Fifteen cows	87,663	3

Average 5844 pounds 3 ounces = 2,718¼ quarts.

Hon. Thomas Allen's "Maplehurst Herd," reported by D. G. Roberts in *Scientific Farmer*, 1878, Panthea, a heifer very remarkable for productiveness, richness and persistent milking, dropped her first calf when twenty-one months and twenty-seven days old, in the year 1875, October 10th, and has given milk as follows: From that date up to January 1st, 1876, gave 1205 pounds. During the year ending December 31st, 1876, she gave a total of 4136 pounds, and during the year 1877 she gave as follows: January, 373; February, 337; March, 367; April, 207; May, 178; June, 176; July, 526; August, 732; September, 609; October, 876; November, 771; December, 548—making a total of 11,041 pounds of milk given before she was forty-nine months old. She was tested at butter-making when twenty-three months old (one month from first calf), the first seven days of November, 1875. Gave 114 pounds of milk, and made 8½ pounds of butter, a pound of butter from 13.41 pounds of milk. The first seven days of November, 1877, gave 161 pounds of milk, and made 12½ pounds of butter, a pound from 12.9 pounds of milk. Taking these averages, she must have made over 850 pounds of butter before the first of January, 1878. Previous to this date she has given milk eight hundred and eleven days; consequently she has made an average of more than a pound of

* Reported for this work by Henry E. Alvord.

butter a day. Panthea has steadily given milk since she came in, and has dropped three calves.

Mr. H. Saltonstall reported in *Scientific Farmer:* Yield of imported Jersey cow Snowdrop 569 for one year, 9085 pounds of milk, and succeeding year 9623 pounds.

Buttercup 2d 5632, with second calf, 1877, yielded 9080 pounds of milk; Mr. F. Davis's cow, Belle of Newton 1747, gave in three hundred and fifty-three days, 1874, 10,085 pounds of milk.

PROSPECT HILL FARM HERD.*

The largest yield ever reported from a heifer with first calf, Fawn of St. Lambert 27,942, making 10,101½ pounds with ordinary feed.

La Petite Mère 2d 12,810 yielded 10,329 pounds of milk in one year on ordinary feed of pasture and hay.

Matilda 4th 12,816 yielded from April 1st to December 1st, 1885, 11,167¼ pounds of milk, and is still yielding about 40 pounds daily, with a prospect of reaching over 15,000 in a year.

Tests of Three Cows—Feed: Hay, Corn-stalks, and not more than 27 Pounds Mixed Ground Feed.

Matilda 4th 12,816. Last calf, April 1, 1885.		Lbs.	La Petite Mère 2d 12,810. Last calf, October 30, 1885.		Lbs.	Ida of St. Lambert 24,990. Last calf, November 16, 1885.		Lbs.
December	11	38	December	11	56	December	11	63½
"	12	40	"	12	53	"	12	67
"	13	39	"	13	53	"	13	67
"	14	39	"	14	50½	"	14	63
"	15	40	"	15	52½	"	15	65
"	16	38	"	16	54	"	16	63½
"	17	38	"	17	52	"	17	65
Total		272			371			454

LOESER FARM HERD, SOMERVILLE, N. J.

Jenny Pogis 22,984 yielded at two years old 5877½ pounds of milk and a calf in less than one year, 11⅗ pounds of milk making a pound of butter; or at the rate of 505 pounds of butter in the year.

Daisy Pogis 23,015, at two years old, yielded 6877 pounds of milk in twelve months.

PERSISTENCY OF JERSEYS IN MILK.

The Jersey breed is the most remarkable for persistency in milking, many cows being perpetual milkers. The Jerseys, as far as I have observed, illustrate the

* Miller & Sibley, Franklin, Venango Co., Pa.

theory of Guenon in respect to this quality with almost absolute accuracy, cows having escutcheons of the first order being perpetual milkers when they are not spoiled by bad milking; those of the second order going dry one month, and those of the third order from two and one half to three months. The cow that never goes dry is oftener a Jersey than of any other breed.

Major Henry E. Alvord reports in *Jersey Bulletin*, October, 1884, two illustrations of persistency in Houghton Farm herd. "As good examples of this excellent habit, I give the records of two heifers. The first is Amalgam 15,360, bred by T. J. Hand, born September, 1881, a granddaughter of Rioter 2d 469. The other is Mrs. Langtry 14,994, born at Houghton Farm, December, 1881. Mrs. Langtry took first prize in her class (seventeen entries) at the last New York State Fair. Amalgam dropped her first calf August 18th, 1883, and her second August 29th, 1884.

"The following is the record of her milking between these dates. She was milked every day, but the milk was not weighed in August, 1884, nor for five days after her first calf.

"Mrs. Langtry dropped her first calf December 19th, 1883, and is due again December 20th, 1884.

"Her product from October 1st is estimated:

Amalgam 15,360.			Mrs. Langtry 14,994.		
August	124 lbs.	8 oz.	December	152 lbs.	1 oz.
September	498 "	6 "	January	608 "	6 "
October	480 "	1 "	February	544 "	4 "
November	452 "	12 "	March	548 "	13 "
December	483 "	13 "	April	504 "	4 "
January	473 "	12 "	May	546 "	.. "
February	447 "	6 "	June	544 "	15 "
March	477 "	2 "	July	525 "	10 "
April	441 "	6 "	August	503 "	.. "
May	451 "	11 "	September	487 "	11 "
June	422 "	4 "	October	400 "	.. "
July	402 "	.. "	November, dry.		
Total	5,155 lbs.	1 oz.	Total	5,635 lbs.	2 oz.

"With small allowances for the milk not used, the product for the year after the first calf is, for one, over 2400 quarts, and for the other 2500 quarts. This is a good record, and the quality is equal to the quantity. But the point especially to be noted is the very even and persistent product, which I deem of the greatest value.

"Both heifers were brought to calf first at a suitable time to develop this important habit, Amalgam in particular. She had the fine nutritious pasturage of

September and October to give her a start, and then, just as she would be tending to diminished yield, when five or six months in calf, fresh spring pasture started her up again and kept her in milk right along to second calf. This calf is strong and hearty, and the dam in September gave more milk than in any month of her first year. . . . Give me the little Jersey, yielding a good mess of rich milk nearly every day I have to feed her, and, properly handled, most profitable, while many other cows are dry.

"When a robust cow keeps up her flow and shows no signs of entire drying before she 'springs' for a new calf, I have never gained anything by struggling to make her dry off, and never experienced any bad result to cow or calf by a continuous yield."

UNRIVALLED RICHNESS OF JERSEYS.

By reference to the tables of butter tests in another part of this work it will be seen that nearly eleven hundred cows have made 14 pounds of butter or upward in seven days. Of these, ninety-eight cows have made 20 pounds or upward, and the highest record is an official test of 46 pounds $12\frac{1}{2}$ ounces in seven days. Of the one thousand and eighty tests, as far as has been ascertained, more than two hundred cows have made a pound of butter from less than 14 pounds or $6\frac{1}{2}$ quarts of milk; and of this number, one hundred and forty cows have made a pound of butter from less than 13 pounds or $6\frac{1}{21}$ quarts of milk; one hundred cows have made a pound of butter from less than 12 pounds or $5\frac{3}{5}$ quarts of milk; sixty cows have made a pound of butter from less than 11 pounds or $5\frac{1}{10}$ quarts of milk; thirty cows have made a pound of butter from less than 10 pounds or $4\frac{3}{5}$ quarts of milk; nineteen cows have made a pound of butter from less than 9 pounds or $4\frac{1}{5}$ quarts of milk; ten cows have made a pound of butter from less than 7 pounds or $3\frac{1}{4}$ quarts of milk; four cows have yielded a pound of butter from less than 6 pounds or $2\frac{3}{5}$ quarts of milk; and one cow, Ethleel 2d 32,291, by official test with first calf, yielded a pound of butter from $5\frac{1}{35}$ pounds or $2\frac{2}{5}$ quarts of milk.

THE ART OF MILKING.

Milking is an art wholly to be learned by practice, and expert skill is developed only in the one who has natural adaptation.

The secretion of the udder glands fills the tubes and reservoirs to distention in from eight to twelve hours, when the cow desires natural relief by the sucking of her calf or the artificial gratification furnished by the hand of the milker. The calf's mouth fits the teat, so that the palate forms a point of resistance in one direction, while the mobile tongue gives an undulatory pressure along the teat channel, forcing the fluid contents against the lower elastic ring, which opens to give vent to a flowing jet, and closes again while the upper elastic ring opens to allow the empty teat to be filled by the pressure from the reservoir above. The hand

assimilates the action of the calf's mouth, the palm taking the place of the palate, and the pliant fingers being substituted for the tongue. Only by much practice can the delicate manipulation requisite be attained, which shall rapidly drive the alternate jets into the foaming pail with the utmost celerity. When the hand is at first applied to the teats the cow involuntarily tightens the upper elastic ring, which seems to make the udder fuller and harder, and the milker gets only the fluid lying in the channel of the teats.

But in two or three seconds, if the cow is in good health and on friendly terms with the milker, she gives a free relaxation of the upper sphincter, and the teats are quickly swollen with the milk that is pressed from the distended reservoirs, and the cow yields herself and the whole contents of the udder unreservedly to the milker's hands. Now is the milker's opportunity to obtain all the milk secreted, provided his movements are dexterous and speedy, for the milk must *all* be drawn during this mood of yielding relaxation of the cow. Any interruption of the steady flow or any slacking of the speed of the jets induces a contraction to shut off the flow, and tends to lessen the amount secreted, so that the moderate or lazy milker never gets the whole mess, because he never allows the cow to yield her full amount, and the habit confirmed makes a great difference in the annual yield of a cow.

The milker should know that the cow yields her milk readily and continuously as long as she feels a sense of relief at his hands, and that the more expeditious he is in gratifying the cow the greater will be the yield. But if the cow is offended or her quietude and comfort disturbed she may refuse to yield her milk altogether until her mind is diverted by feeding, and even then a stranger or offensive person will fail to obtain all the milk.

It should also be borne in mind that the udder and teats are of a delicate structure, and consequently may be permanently injured by casual violence or any harsh usage. No other method of drawing the milk except by well-trained hands is to be tolerated, unless it be in a case of disease where the ordinary hand pressure cannot be endured or fails to draw the milk. In such instances a milking-tube may be used until the disease is remedied. The tube must be of a good pattern, perfectly smooth, and always well oiled at the time of its introduction, when it may be passed slowly and gently through the sphincters to allow a steady flow from the reservoir.

In any case the milking-tube is a necessary evil, and must only be used in an emergency, and immediately discarded when the emergency is passed.

Good milkers are hard to find. The skill and thoroughness with which the milking is done is one of the most important factors in successful dairying and breeding. Milking must be done gently, quickly, thoroughly, and with all cleanliness. The structure of the lacteal organs is so delicate that without the requisite gentleness the teats and udder are liable to serious injury.

The milk cannot be drawn too quickly or the udder stripped too thoroughly, and

unless done very quickly and very thoroughly loss and injury are sure to follow, for the cow that is milked properly gives her full quantity with due persistency, while the cow that falls to the hands of an indolent and careless milker will fall off in quantity and persistency, often to her permanent injury. Many cows are utterly ruined by ignorant, lazy and vicious milkers. Cleanliness of character and cleanliness of person shine forth in the stable and the dairy as cardinal virtues, while filthiness of person, filthy character, filthy language and slovenly work are intolerable sources of moral, physical and financial degradation. The milker must have a love for all the cattle under his care, a love that would shield them from all injury and every hurt; he must treat a Jersey cow as gently as he would a lady, and her calf as tenderly as a child. He must be cleanly in dress, with clean linen, clean jacket, clean overalls and clean shoes, and never a dirty hat. He must not chew or smoke tobacco, or drink whiskey. No pipe or cigar should ever be allowed inside the stable or the dairy. The man who drops a pipe into the milk is quite as dangerous as the one who allows dung and dirt to accumulate in the pail.

The milker should have soft hands and quick, strong muscles. The cow should be brushed, the udder and teats carefully wiped with a clean, moist cloth previous to each milking, and a little vaseline applied if the teats are sore or chapped. The "Perfect Milkpail" or its equivalent is essential to avoid all dust and dandruff, and to strain the milk as it is drawn. In this pail the lid is used for a seat, while the milk falls upon a strainer in the spout of the pail. A narrow-mouthed can with two or more thicknesses of fine cloth tied across for a strainer may be used, laying a small plate or saucer in the centre to receive the stream and prevent the wear of the cloth, as well as to insure clean straining.

KICKING COWS.

Kicking cows should be treated with great gentleness, as their tendency to kick is usually the effect of sore teats or a peculiar nervous excitability. Cruelty and punishment only confirm the habit. Any arrangement which compels the cow to stand upon three legs will ensure safety to the milker. Bending up a foreleg and slipping on a link of rope or a rubber elastic, or drawing up one hind leg by a fixed pulley, are convenient means for controlling any valuable cow that has this unfortunate habit. The hocks may also be firmly bound together by buckling a pair of leather stockings upon the legs, like the manner of handcuffs.

MILKING MACHINES.

In milking, no machine will ever be able to compete with the human hand. All attempts to use mechanical appliances are sure to result in serious injury to the cow and financial loss to the owner. Good milking should be cultivated as a fine art in

every dairy, and those cows should be bred which yield the greatest returns for so laborious an occupation.

Between the rich milk secretion of the best strains of Jerseys and the excessively watery secretion of the Dutch or Holstein breed, there is the widest possible difference. It is much easier to draw water from a hydrant by the force of gravity than to laboriously pull it from the teats of a Dutch cow.

CLEANLINESS IN MILKING.

The stable should have a dressing-room where the milkers can wash their hands, black their shoes, and tidy themselves. Every operation in the dairy should be absolutely cleanly, and the milker always tidy enough to enter a parlor or to sit at the dinner-table whenever he presents himself to the task of milking. Whether this branch of work can best be done by men or women is a question unsettled. Women have softer hands, but men have more of the necessary muscular power. Perhaps the singing dairy-maid will yet reappear in the American Jersey dairy as a necessary element of success.

PERPETUAL MILKERS.

The Jersey cow's habit of persistent milking should be cultivated. Perpetual milkers cannot be forced dry without injury.

Some cows yield as high as from ten to twenty pounds of milk daily at calving time without any interruption to the habitual flow. Such cows sometimes have small calves needing special care, that grow, however, to full size and vigor, and inherit the family propensity of perpetual milking. It is worse than useless to attempt to force such animals into the habits of other breeds that go dry from three to six months. Good Jerseys will not adopt the habit. Heifers of persistent families may require milking for one month before the first calf, when the udder is early in its distention, in order to prevent garget.

SELF-SUCKING COWS.

By the customary performance of licking and dressing herself a cow may acquire the habit of relieving her own udder of its contents, much to her enjoyment and the dissatisfaction of her owner. Many cruel devices have been invented to cure the habit, but most of them injure the cow without attaining the desired result.

The simplest way to treat such a cow is to keep her in the stall and milk her three times a day. Whenever she is let out for exercise give the teats a coating of the following mixture: fluid extract of wormwood one fluid ounce, and gum arabic mucilage two fluid ounces. Apply with a mucilage brush, covering the teats. This is exceedingly bitter, and the cow ought to be fully satisfied with one attempt, but it may be well to repeat it until the habit is thoroughly disrelished and forgotten.

LEAKING COWS.

For an involuntary flowing of milk the essential remedy is frequent milking. If the udder is relieved three or four times daily at regular intervals it is indeed a bad case that cannot be thus remedied. An extra good cow that has this fault may be milked five times a day, and that would prove profitable not alone by saving the milk, but also largely increasing the yield of cream.

THE ESCUTCHEON AN INDEX OF PERSISTENCY.

Instead of trying to force cows dry, if one desires to have his herd rest for one, two, or three months, upon the supposition that the calves will develop more vigor of constitution, let him rather follow the Guenon schedule and make his pick of cows that will go dry spontaneously when wanted to do so. If one wishes his cows to go dry three months let him select and save all the cows and heifer calves having hind escutcheons of the third order. There will be some exceptions of course to this law, but even among a race of persistent milkers like the Jerseys the Guenon index is a fair guide as to the time a cow will go dry.

If you wish cows, however, that will do their utmost in the production of milk and butter, it would be well to cultivate the ideal escutcheons as illustrated in another part of this work. Those cows that have a perfect hind escutcheon and a broad belly escutcheon extending to or beyond the navel will not only do the utmost consistent with their race, family and breeding, in quantity and quality, but will be almost certain to never go dry unless forced dry at the risk of organic injury.

FREQUENCY OF MILKING.

Large producers ought to have the udder completely emptied and thoroughly stripped thrice daily, at equal intervals of eight hours. The punctuality of the milking hour is also of great importance, for punctuality cannot be violated without affecting unfavorably the habits of secretion in the cow. For this reason it is a great injury to the udder to allow it to become distended and painful far beyond the usual milking time, "stocked," as we often see at public sales, where an udder is sometimes allowed to become so strained as to be deformed and unsightly in carrying more than nature designed it should hold. Three milkings daily increase the secretion of milk and cream so as to add a large percentage of profit above two milkings.

NUMBER OF COWS TO A MILKER.

In large herds it becomes an important consideration to limit the number of cows to be apportioned to each milker, and to confine each milker to the cows selected for him. Milking being the most important work in the dairy, in that it

requires a special skill in delivery, great speed, and uncompromising punctuality in its performance every day in the year, the milker should not be overtaxed, and, as far as practicable, *he should always milk the same cows and in the same order and by the clock, on time.*

In every dairy there is the continual variation from flush yields to the minimum or dry state. It is possible for an expert to milk twenty cows, but with extra good milkers better results will be obtained by allowing not more than ten cows to each milker. Much depends upon the men and the cows. If a milker is given too many cows he will be apt to acquire habits of slackness, to the loss of the owner in many ways, by reducing their productive capacity, or preventing their complete development as dairy cows. The better the cows the greater the number of milkers required, in proportion to the herd number. As a matter of economy Jerseys are the cheapest milkers, because they give a much greater value in cream, butter, cheese, and all the nutritive elements of milk, for a given amount of labor of all kinds, than any other breed of dairy cattle.

It is very expensive labor when men are hired to draw watered milk from cows' udders, and the manipulation of the dilution is also very expensive after it is drawn. The best breed is that which gives condensed milk in large quantities, rather than an immense quantity of watered milk.

Every dairy should have a tabulated set of rules posted in the milking-room, requiring cleanliness, punctuality, alertness and thoroughness in every milker. The cows ought to be inspected by the owner or his herdsman after each milking, to see that they are thoroughly stripped.

TREATMENT OF MILK FOR HOME USE OR TRANSPORTATION.

Milk, to be in good condition for use at the farm, or to bear transportation, needs, at all seasons of the year, a special preparation. *As soon as it is drawn it must be quickly reduced to a temperature below 60°.* This is readily done by placing it in tin cans, which are set into cold spring water. The water-line must always rise higher than the milk, and the mouth of the can protected by a cover of muslin. If desired, the milk may be gently stirred for a half hour before putting on the muslin cover, as the stirring facilitates the cooling. In no case must the milk be as high as the water in the tank or spring, for it must be equally cooled throughout. Never mix milk of different temperatures. The large cans may be transported in coolers that keep the temperature below 62°, or the milk may be transferred to glass bottles, which can be sent to market in refrigerator cars or wagons suitably provided with cooling boxes. Milk may be cooled by running it through a spiral pipe immersed in a tank of spring-water fed from a pipe passing beneath the ice-house. Otherwise cover the cans with wet blankets.

It is essential that the first cooling be done promptly, to insure keeping quality.

The flavor of the milk is also greatly improved. The stirring prevents the cream from rising, and is essential where the milk is to be used by young children.

The stirring is important with Jersey milk.

CREAM.

Sweet Cream, soft, smooth, palatable and of delicate flavor, is the choicest element in every sumptuous repast and the most delicious luxury of the civilized world. It gives a most agreeable finish to the best productions of the culinary art, so that many of the most wholesome dishes are incomplete without its crowning excellence.

Stewed celery, sweet corn, lima beans, cauliflower, sweet peas, asparagus, artichokes, baked potatoes and spinach are all enhanced in richness by the addition of this harmonizer.

The Garden Royal, the Pippin, the Mother Apple, and all the rich aromatic apples when roasted or baked mate well with sweet cream.

The melting flesh and rich, racy flavor of the Nectarine Peach, and the superb, meaty Melocoton, are never so well appreciated as when mingled in a bath of cream.

The strawberry amateur will readily admit that the spicy flavor of Belle Bordelaise or Triumph, and the mild flavor of the Downing are enhanced by the same means, while the Brinkle raspberry or the Caroline, the Turner, or the wild "black cap" temper most deliciously dulcet creams.

The Jersey cow is the most noted producer of cream, and that, too, of a very fine quality.

The best cream has the peculiarity of being developed in large globules, and this is one of the characteristics of Jersey cream.

PHYSICAL QUALITIES OF CREAM.

Cream, like milk, varies greatly in character with different breeds of cows, and almost as widely with individual cows of the same breed, and responds, in its elements, to various vital and food changes influencing its secretion. Its chemical composition consists of fat, casein, albumen, sugar, fixed salts, and about fifty per cent. of water.

Perry gives analyses of cream as follows:

	Water.	Fat.	Casein, etc.	Sugar.	Ash.
Jersey Cream.............	36.40	56.80	3.80	2.80	0.20
Country Cream...........	49.00	42.00	4.20	3.80	0 60

Sharple's analysis of centrifugal cream from Shorthorn and Ayrshire grades gives:

Specific Gravity.	Water.	Fat.	Casein.	Sugar.	Ash.
956.4	49.45	43.14	3.31	3.70	0.40

The cream of the Jersey breed has large globules of remarkable uniformity in size.

The cream of all breeds varies greatly in density, as also in different individuals of the same breed, so that the so-called creamometer is exceedingly misleading in regard to determining the amount or quality of cream and butter to be obtained from different specimens of milk. Some cows produce cream that is very light and fluffy, while that of others may be very dense, giving as much or more butter from half the bulk of the former. This variation of density is very clearly set forth in the report of the Maine Experiment Station, 1883, showing a test of twenty cows as follows (I have rearranged the table in order to give the column of cubic density in the order of arithmetical progression):

TWENTY SAMPLES OF CREAM.

NUMBER OF COWS.	Pounds of Milk per Day.	Cream per cent.	Pounds of Butter per Day.	Pounds of Milk for one pound of Butter.	Cubic Inches of Cream for one pound of Butter.
1	14.93	18	1.00	14.93	74
2	20.06	21	1.50	13.40	79
3	12.00	18	.75	16.00	84
4	32.68	18	1.56	17.65	89
5	20.62	20	1.43	16.35	92
6	13.87	27	1.00	13.14	99
7	20.56	27	1.50	13.70	104
8	14.75	25	1.00	14.75	104
9	22.00	21	1.25	17.60	104
10	15.62	22	.87	17.74	108
11	17.56	30	1.37	12.77	108
12	30.25	21	1.62	19.23	113
13	20.62	20	1.00	20.62	116
14	18.93	19	.87	21.64	116
15	30.75	32	2.31	13.29	120
16	37.43	25	2.12	17.61	124
17	16.31	28	1.00	16.30	128
18	21.75	16	.75	29.00	130
19	16.93	21	.75	22.58	133
20	11.43	37	.87	13.70	136

Number 1 shows eighteen per cent. cream, of which seventy-four cubic inches make a pound of butter, while number 20, giving thirty-seven per cent. cream, or

more than twice as much as number 1, requires one hundred and thirty-six cubic inches to make a pound of butter.

Again, number 18 shows sixteen per cent. of cream, which is exceedingly light, requiring one hundred and thirty cubic inches for a pound of butter and twenty-nine pounds of milk for the same.

Number 11 is the richest, where thirty per cent. of cream requires one hundred and eight cubic inches for a pound of butter from 12.77 pounds of milk.

The breeds of cows are not stated in the report.

These figures are sufficient to show that mechanical tests for cream are entirely misleading.

Chemical analysis alone can determine the essential richness of milk and give the relative proportions of constituents.

The churn rightly used is the test for the amount of butter obtainable from milk or cream.

At the De Kalb creamery, Illinois, each test of milk from separate farms is made by a sample measuring one hundred and thirteen cubic inches.

The milk is rated for each farm according to the amount of butter in the sample tested.

Taking one hundred as the standard, the variation in that creamery ranges from sixty-two to one hundred and seventy-two, thus showing that some samples of cream produce, bulk for bulk, three times as much butter as others.

METHODS OF SEPARATION.

The Centrifuge.

The globules of cream, which are simply suspended in the watery solution containing the other milk elements, and having a specific gravity of 956 to 1020 as compared with 1035 of skim-milk, at once the fluid is at rest after removal from the cow, begin to float to the surface, the largest globules moving to the top and the smallest rising last. The speed with which the globules separate from the milk depends upon a number of causes.

One of the great discoveries of modern times is the application of centrifugal motion to produce a rapid separation of cream from milk. All machines of this character have been invented within the past twenty-five years.

Among the machines that have been successfully employed are the Danish, the Swedish, by De Laval, and the Nakskov, of Denmark. In these three the cream and skim-milk are separated by their velocity while in rotation. The Pape machine accomplishes the separation by hydrostatic pressure. It is claimed for the Pape machine that the milk and cream leave the drum in quiet currents, without any

BONSILENE 9811.

Black Bess—Pilot Type.

HIGHLAND HERD.

JAMES N. SMITH, LITCHFIELD, CONNECTICUT.

foaming or squirting, and that it performs a greater amount of work than any other separator.

The Nakskov is the cheapest, and it is claimed that one horse will run two machines, each capable of five hundred pounds an hour. The Danish-Weston is used in many large creameries. The De Laval centrifuge has been introduced into several American dairies.

The leading points of a good centrifuge are:

1. It must be of first-class workmanship, running smoothly, safe from explosion, and resting upon a firm and solid foundation.
2. It must be accessible for complete cleanliness in all its parts.
3. Simplicity of construction, so as to be easily understood by farm help.
4. The milk must be under control at all stages of separation.
5. It should be of a size suited to one or two hours of work daily.
6. The separated cream and skim-milk should be discharged in sound condition, with no foaming nor any rise of temperature.
7. The machine should be cheap and easily set up.

THE POWER.

The power required is a steam-engine for the larger sizes; the smaller centrifuge may be run by from one to four-horse-power low-pressure engine.

The De Laval makes seven thousand revolutions a minute, with seven hundred pounds of milk an hour, at an indicated 1.03 horse-power.

The small machines are safer and more desirable, and in a large dairy it is better to have several small than one or two large machines.

The milk must be passed through the De Laval centrifuge as soon as it is drawn and while it has the animal heat, because great loss results from cooling. Or if the milk has been cooled it must by artificial heat be restored to its natural temperature of about 102° Fahr. The cream must be cooled as quickly as possible after separation, to fit it for keeping, or carrying, or making good butter.

ADVANTAGES OF CENTRIFUGE CREAMER.

1. The cream can be separated as soon as it is drawn from the cow.
2. It saves the cooling of the milk.
3. It saves much time.
4. It obtains from ten to fifteen per cent. more cream.
5. It insures regular and thorough separation.
6. It gives the use of both cream and skim-milk, with an advantage of freshness, from twelve to twenty-four hours in advance of natural separation.
7. It removes a large percentage of the inevitable impurities in milk as well as foul odors.

8. It saves much room.

9. It gives cleaner butter and cheese, as well as clean cream.

10. It saves expense.

11. It increases profits.

12. The machine can be set so as to give a light or a heavy cream.

13. The cream is of uniform quality, and fluid.

14. The centrifuge can leave any desired proportion of cream in the milk for the purpose of cheese-making.

15. The first, or light cream, is of extra quality for many purposes, and makes a finer quality of butter.

16. The warm skim-milk can be fed at once to calves, which is a great advantage.

17. The quality of cream is of the highest excellence for table use.

18. Odors from feed and animal flavors are removed, either wholly or in part, by the rapid aeration of the cream.

19. Ripening of cream is initiated by rapid aeration during separation.

CREAM SEPARATORS AT THE LONDON DAIRY FAIR.

Below we give the report of the judges on Cream Separators at the late London Dairy Fair, published in the English *Agricultural Gazette.* It will prove of great interest to every butter-maker in America, as it answers every question with regard to this new system. Following is the report :

CREAM SEPARATORS.

"In reporting upon the separators first, they do so feeling that that class possesses more interest to dairy farmers than any other classes of dairy utensils, and being undoubtedly the dairy implement of the future.

"In considering the points that were necessary to be taken into account in testing the machines the judges had to look at what was possible to be done in the time at their disposal, which was necessarily limited to the days of the show ; and they thought—rightly or wrongly—that the council did not require them to enter into a full scientific test, so much as the more practical one of saying which machine they considered best adapted for use by farmers for the production of cream of good quality ; and to this end the judges drew up a list of points, which they considered the most important to test the machines ; and, moreover, they took the somewhat unusual course of giving a copy of the requirements to each exhibitor, so that they might be able to work their machines to the best advantage in exhibiting these points.

"The points were as follows :

"1. Construction (embracing simplicity of design, facility of cleaning, emptying and oiling).

"2. Analysis of skim-milk.

"3. Analysis of cream.

"4. Quality of cream.

"5. Temperature at which the milk was separated.

"6. The time taken in separating a given quantity.

"7. The quantity of milk required to work the separator.

"8. The cost of the separator, including the intermediate motion.

"9. The cost of fixing.

"10. The revolutions.

"11. The safety.

"12. The convenience of delivery of the skim-milk and cream to a higher or lower level.

"13. The adaptability for horse-power.

"14. The intermediate motion, embracing simplicity of construction, readiness of throwing in and out of gear, and any arrangement for neutralizing the effect on the speed by the stoppage of the horse.

"15. The power required to work each machine.

"As regards the last point, the judges were informed the council did not desire the machines to be tested on this point. They further wished to test the weight of skim-milk and cream, but were prevented by the absence of the steward.

MACHINES COMPETING.

"There were four machines competing, three of them being Danish, exhibited by the Aylesbury Dairy Company—these were exactly similar in design, and, in fact, were three different sizes of the same machine—and De Laval's, exhibited by D. Hald & Co.

"For convenience it will be better to distinguish the three Danish machines as A, B and C; A being the largest machine, B the medium-sized, and C the smallest.

FIRST POINT.

"(1) Taking the points deemed most essential by the judges in rotation, we have, first, construction. It is not deemed necessary to give any illustration of the two separators, as they are most probably familiar to all those interested. It certainly seemed that in the detail of points indicated, viz., simplicity of design, facility of cleaning, emptying and oiling, the advantages were all on the side of the De Laval. On the judges requiring this machine to be emptied, the drum was simply lifted out of its bearings and turned upside down by one man, the contents being emptied into a bucket, this occupying a very few minutes. In the B Danish the milk had first to be removed by a siphon, and then it seemed to require two or three men to undo the several screws and adjustments, and to lift the drum from its place. A hole was

provided in the base of the drum, into which a conical plug was driven; this plug had to be knocked out with a hammer before the milk left in the drum, after the siphon had extracted all it could do, could be run out. There seemed to be great difficulty in getting at this plug to knock it out, when the drum was in its place, and it seemed to be at best a clumsy contrivance. These remarks apply to all the four Danish machines, which were of similar construction.

SECOND POINT.

"2, etc. Before considering the next point of analysis it will be convenient to state the course of proceeding. Four hundred pounds of whole-milk were ordered to be weighed out to each machine, the milk being first mixed in a large tank provided for the purpose to insure equality of sample. The judges wished to try them all simultaneously, but, unfortunately, only the quantity was weighed out for two of the machines—the De Laval and the B Danish—on the first day. The A Danish and the C Danish not having their milk weighed out till the next day was unfortunate, as it somewhat altered the conditions of the contest; but in the absence of the steward it was impossible to rectify the error. The temperature of the whole-milk in the large tank showed 56°. The following table will bring concisely together the different points in connection with each machine which were considered important. It is not thought necessary to give the different totals of the complete analysis, as only the item 'butter fat' is important. The effect of the action of the separator on the 'solids not fat,' or cheese-making matters in milk, is a point that has not yet been tested, though it is undoubtedly an important one, as certain curious facts in connection with them have been observed:

Name and Machine.	Butter-fat in Whole-milk supplied.	Butter fat in Skim-milk of the Separator.	Butter-fat in Cream of the Separator.	Temperature at which the Milk was separated.	Time in separating 400 lbs.	Quantity of Milk required to work Separator.	Cost.	Revolutions attained per minute	Revolutions required per minute.
				Deg.	Min.	Lbs.	£		
De Laval's	4.32	.67	47.36	62	40	12.25	37	6,234	6,000
B Danish	4.32	.18	15.65	88	42	30.75	41	2,800	3,000
A Danish	3.60	.32	26.42	62	*32	128.75	73	1,600	2,000
C Danish	3.60	1.62	33.12	74	68	5.25	26	3,400	3,600

* By an error of the steward six hundred pounds were weighed out to this machine.

"It will be observed that the butter-fats in the whole-milk supplied showed an excellent quality of milk, and as the most important point of a separator is to separate the cream from the skim-milk, the analysis of the skim-milk and of the cream must be compared to see what quantity of fat is left in the skim-milk, and what quantity of skim-milk is left in the cream; and it will be noticed that, though the De Laval left a somewhat large percentage of fat in the skim-milk, it left little or no skim-milk in the cream, the cream from this machine being far above the standard of ordinary cream.

"The B Danish, though showing only an average percentage of fat in the skim-milk, showed a remarkable result in the cream, being considerably below the standard of ordinary cream; and the explanation of this is that a large percentage of skim-milk passed into the cream, probably about fifty per cent. of the whole-milk supplied to it. In plain language, this machine absolutely failed to carry out the very first element in a separator, viz., to separate the skim-milk from the cream; and, for the purposes of butter-making, it would have been cheaper to have churned the whole-milk instead of having the expense of separating.

"The A Danish, showing rather above the standard of fat left in the skim-milk—though not so high as the De Laval in the cream—there is still a large percentage of skim-milk, leaving the cream of poor quality.

"The C Danish, being the smallest of the Danish machines, and looking like a toy beside the leviathan A machine, shows a very large percentage of fat in the skim-milk (about two and one half times as much as the De Laval); and, though the cream is better in this than in either of the other Danish machines, it must still be declared poor, considering the quality of the whole-milk separated, and, like the A and B machine, shows skim-milk mixed with the cream. From what has been said about the mixture of skim-milk with the cream in the Danish machines, it will be apparent that the quality of the cream, as it ran from these separators, was decidedly inferior. This point had the special attention of the judges, as it is an important one where the sale of cream is an object. The machines were tried as to their capability of producing thick or thin cream at pleasure; and, whilst the De Laval proved itself capable of doing this, the Danish proved themselves incapable of doing it; in fact, the operator tried to produce thick cream at the request of the judges, but failed.

TEMPERATURE.

"5. The next point was the temperature at which the milk was separated. This is a very important one, as upon the lowness of the temperature at which the milk is separated depends the keeping quality of the skim-milk and of the cream; and where the sale of the skim-milk and cream is an important item the lowness of temperature in separating is a *sine qua non*, as where the milk is separated at a high temperature

(as was done in the B and C Danish) the skim-milk and cream will be liable to go sour very quickly.

"The De Laval and the A Danish separated the milk at the low temperature of 62°, but the B and C Danish separated at the high temperatures of 88° and 74° respectively. It is claimed that these Danish machines can separate at 40°. If so, then why was it necessary to separate at the high temperature they did? and how was it that at these temperatures they turned out such inferior work, as it is a well-known fact that separators do their work more completely under a high than under a low temperature?

TIME.

"6. As regards the next point—the time taken in separating—the judges preferred, under the circumstances, to have a given quantity passed through the separators instead of separating by time. The objection urged against this is, that whilst it is the *spécialité* of one machine to show the best results in a short working, the other only does it in a long working. But surely this reasoning is false. The machine that gets quickest into its working is the best for farmers.

"7. The seventh point—the quality of milk required to work each separator—is practically not of so much importance, because each separator, whatever its size, works out the last contents by using skim-milk to finish with. But the judges thought it necessary to weigh the last contents for information, and to see how easily the drum could be emptied if it was found necessary to do so.

"8. As regards the eighth point—the cost—having regard to the quality of the work done, the De Laval was the cheapest, or rather the most worth the money; and as regards the cost of fixing them, there seemed little to choose between them. All machines travelling at a high rate of speed require a firm foundation, and it is very false economy to pinch the expense in this particular.

"9. The ninth point—revolution—there seems, so far as experience has gone, no practical evil resulting from the high speed at which the De Laval machine rotates, and we are rather inclined to regard the difference in speed between De Laval and the Danish as more apparent than real, depending upon the size of the drum. But this is a question more for mechanical engineers to solve. But with this high speed comes the question of safety, and all the machines were made strong enough for the work they had to perform.

"In the A Danish was exhibited a contrivance for raising the skim-milk to a higher level, and succeeded in lifting it nine feet two inches, and it probably would have been able to have lifted it higher had pipes been prepared for that purpose. It is simply the elongation of the pipe that conveys the skim-milk from the separator drum. This power of raising the milk would be very useful in factories where large bodies of milk are in daily passage, but what effect the weight of such a column of milk would have upon the separating power of the machine there was no time or

opportunity for testing. This raising the milk seemed to be applicable to all the Danish machines, and was a point in their favor.

POWER.

"10, etc. On the question of the adaptability for working by horse-power, it was not thought necessary to test the machines, as the council did not desire that the power required to work each machine should be noticed ; and there is no doubt that all the machines are suitable for working by horse-power, as at the Royal Agricultural Show at Shrewsbury this year both the De Laval and the Danish were worked by horse-power satisfactorily, and the judges therefore confined their attention to examining the intermediate motion, with a view to seeing what arrangement was made for counteracting the effect of the uneven paces of the horse. In the De Laval this was met by the arrangement of two friction pulleys, which worked together or independently, according to circumstances, and seemed to answer the purpose. In the Danish there was a simple clutch action on the shafting, which also answered perfectly the object desired.

THE DE LAVAL BEST.

"In summing up the results of these remarks, it will be noticed that, though the De Laval and the Danish machines are on an equality as regards some of the minor points, in regard to the essential points of construction, separation, temperature and quality of cream, and analysis of cream, the De Laval was far ahead of its opponents, and quite deserved the gold medal given by the council. The power of raising the skim-milk after separation to a higher level seemed to entitle the large A Danish to a second prize, but the failure to separate the milk satisfactorily debarred the other Danish machines from any further recognition."

THE PAN SYSTEM.

The setting of milk in shallow pans, wooden tubs, or delf crocks is the oldest method of all. In this method the cream varies greatly, according to the weather and other conditions. This is the poorest method for the production of marketable cream, as the cream becomes quite sour if left until wholly separated from the milk. If exposed to currents of air the surface of the cream becomes dry and leathery, requiring a system of ventilation that prevents the possibility of such a result. The temperature, if controlled, should be at about 62° to 64° Fahr.

THE ICE-COOLING SYSTEM.

By submerging deep cans in ice-water a quicker separation is obtained than by the open pan method. The submerging is generally conducted at a lower temperature than the open pan system admits, being about 40° to 50° Fahr. for

about twelve hours. The pan and the deep setting produce about the same amount of cream.

According to Professor Fjord, who made extensive experiments with the three systems in Denmark, the centrifuge produced a more complete separation of cream than the other methods, while the deep ice-water setting was for a part of the year a failure. With his experiments the skim-milk of the ice system contained an average of 0.53 per cent. fat against 0.11 per cent. for the centrifuge.

Several analyses of skim-milk from the centrifuge in Mr. Burnett's dairy at Southborough, Mass., gave, by analysis of Lawrie and Terry, after milk had been in machine fifteen minutes, 0.90 per cent. of fat. Three analyses by Mr. Sharples gave 0.07 per cent., 0.05 per cent., and 0.10 per cent. of fat.

By the later improved separators a still more thorough removal of the cream is secured, specimens of skim-milk showing, by analysis of Professor Fjord, 0.2 per cent. of fat.

Some of the results have been computed and comparisons made to show that an average gain of fifteen per cent. is the net gain of the centrifuge over other methods of gathering cream, a great saving for the creamery or the butter dairy.

Average good skimming by the centrifugal separator is to leave from 0.15 to 0.25 of one per cent. of fat in the skimmed milk.

The centrifuge or separator may eventually become of vast importance in our dairy system, by immensely improving the methods for marketing a superior quality of sweet cream, by the increase of facilities for making a finer quality of butter, and by giving an impetus to every department of dairy business and the raising of the best dairy cattle.

CHEESE.

In our own country a vast quantity of cheese is made for the export trade. For our domestic use cheese is considered a condiment or a relish, rather than a staple article of food. Consequently a taste is cultivated for choice quality and rare flavors, which requires a corresponding improvement in methods of cheese-making. There are of necessity various orders of taste and many oddities, but the popular taste is for cheese of the very best quality in any class or style of manufacture.

Good cheese may vary greatly in density and flavor, but for a general description we may say that it should have a substantial body, not too dense, of a plastic and satiny feel, and readily melting upon mastication. The flavor should be clean, clear and cheesy, and its odor rich and aromatic, with sufficient cream in its texture to be perceptible to the touch and taste and give it a decidedly buttery quality.

Such a cheese is very palatable, digestible and wholesome, but the ordinary article of commerce is the reverse in every particular, and a source of indigestion and many gastric disorders. That a great advance will soon be made among our American dairies in the production of cheese of extra quality I firmly believe. The Jersey cow of necessity will be a leading factor in the improvement, for I think it will soon be demonstrated that she is the best cheese cow in the world.

Not only must the methods adopted be radical improvements in relation to the prevailing customs, but they must be in advance of the best foreign processes from which we receive the popular imported cheeses.

There are doubtless defects both in the methods of treating the milk previous to and in the various stages during the progress of the manufacture.

IMPROVED CHEESE-MAKING.

The Galloway *Advertiser* (1884) reports a meeting at Dumfries, Scotland, of the Scottish Dairy Association to listen to the method of cheese-making of Mr. J. B. Harris, of Antwerp, N. Y., as practised and taught by him in America and the dairy-schools of Great Britain.

By answering questions of various members the following facts and statements were elicited: " He had always opposed using any foreign acids. There was acid enough in the milk. If you would only give it time and ripen your milk properly before you commenced to make the cheese, there would be no trouble in making it good. At Baldoon last week—where they had no steam—he kept one cooler full of Saturday night's milk and two of Sunday's, and worked the milk together on Monday. It was very ripe then. He got through the work about two o'clock without any sour whey. He heated the milk very gradually up to 90°, then to 100°; then he added cold milk and brought it down to 84°, and when it was at that temperature he put the rennet in and set it. They got through the operation about three o'clock. Next day he had the same quantity of milk, Sunday night's and Monday morning's; but the air was so changed, being much colder, that he did not get through till half-past four. So it would not do to make cheese by the clock. You must work as the milk will. When you put in the sour whey the milk will coagulate quicker, and you think it is working faster; and so it is, but it will spoil your cheese.

"That was the reason, probably, why their cheese-making had gone backward since they adopted the sour-whey system.

" By the ripening of milk he meant a ripening as a pear or apple ripens that is unfit to eat when pulled, but will become ripe by lying.

" It is impossible to make cheese with milk as it comes from the cow. It must be of a certain age. You may call it acidity, but it is just *ripening*.

" If cheese is colored I put the coloring in a good while before the rennet.

Spotted cheese occurs because the coloring is not properly mixed. Too much acid will spoil the coloring.

"If I was manufacturing cheese on a farm I would prefer my own rennet. Then I would know what I had. I would not buy any nostrums or patent rennet. But I would, in the first place, get the calves' stomachs right. Many people in Scotland kill calves which have never had a mouthful of milk. That is not fit for human food.

"There is nothing in the stomach except what was in the cow during gestation. It is just poison. The calf ought to be three days old—better more. Feed the calf in the morning and kill it at night, or at night and kill in the morning. Kill it just when it is ready for feeding. Don't let it wait twenty-four hours, or the calf will be hungry and its stomach inflamed. You want the stomach healthy and in good condition. Turn the stomach inside out, and shake out all the curd. Some people save the curd, but that is good for nothing.

"Rub the stomach inside and outside with salt. Then hang it up in some place where the temperature is not too high, as 130° will spoil any rennet.

"I have made cheese in a ten-quart pail, and good cheese too. It does not matter what vessel you use if you only make cheese with common sense. I would certainly prefer steam in making cheese, because it lessens the labor; but a small farm can turn out quite as good cheese as a big one.

"To know when milk has reached the proper maturity you must ascertain just the amount of maturity you need to make good cheese. You can arrive at it by two or three trial makes, and that will last you the whole season.

"You find out that the milk is of proper maturity, then take a teacup and teaspoon, fill the cup with milk, put in a teaspoonful of rennet, and mark how long it takes till the milk is coagulated. That will be your guide for the future. You will know how long it takes for the milk to ripen. The other morning a teacupful coagulated in ten seconds, yesterday it took twenty-five seconds. The milk was so much sweeter, consequently it had to wait till it matured. The more mature the milk the quicker it will thicken. Milk just come from the cow at 98° will take some time to coagulate.

"Let it stand for twenty-four hours, and then get it up to 98° again, and it will coagulate more quickly.

"There is acid in the milk, but not sour whey acid. I might just as well put in a jug of vinegar as sour whey—it would give a better flavor.

"You may know the ripeness of the milk by tasting; but it requires a very acute taste.

"When the cows are on grass I heat to 98°, then I stop heating; and as soon as I get the heat assimilated all through I stop stirring till it gets ready to draw off the whey. I stir about an hour, or just the time I'm heating.

"Turnips give cheese a bad flavor. The best feeding in the world is green cut hay. Put it up green, cure it properly, and cows will do better on that and a little bean meal or cotton cake than anything else.

"In America we give them Indian corn meal and shipping stuff, what they call shorts, from the mill, with short cut hay.

"*Ensilage is not fit to make butter or cheese.* Your cheese would be all whitish trash. Cheese will come to the proper stiffness by putting in the cream the last thing before putting in the rennet; then stir that around, and it catches all the cream."

EUROPEAN METHODS.

Summary of a paper read by Mr. Harris before the Scottish Dairy Association, as reported for "Country Gentleman" by Mr. Stephen Beale.

"The Cheddar system has been of great service to the country, but a feeling prevails that it is not at present meeting the requirements of the market. This is chiefly attributable to the way in which the system is practised in most of the dairies in Scotland. A want of knowledge of much of its working has much to do with the inferior quality of the goods produced. Many beliefs and suggestions have been written on the subject of cheese-making, but I doubt if there can ever be a code of rules laid down that the maker can follow under all conditions of weather and other influences. The cheese-maker must use his own judgment, and vary his processes as often as the atmosphere changes. Good, well-ripened cheese is a help to digestion, while bad cheese is a cause of indigestion. Among the causes of bad cheese are: cows out of health, or having access to bad water; want of cleanliness; setting the milk at night too thick or too thin; heating the milk too high or too low; too much or too little rennet; not cutting at the proper time; scalding too fast; drawing off the whey too soon or not soon enough; not getting the whey properly out; allowing too much or too little acid to develop before salting; putting to press too soon; putting on too much pressure, and having too much or too little heat in the curing-room. It is of the utmost importance to have the milk in the right condition before adding the rennet, as when that is right the cheese is half made. These are matters which the cheese-maker has to discover for himself, as the milk works differently on every change of soil. There are a hundred pitfalls before the cheese-maker, and it requires the greatest care and attention, with experience, common sense and skill, to accomplish the desired end. It is possible to do everything right and at the proper time except one, and because of that exception to have a faulty cheese.

"The active agents that affect the character of cheese in its making and curing are heat, rennet, salt, moisture, lactic acid, and the alcoholic acid developed by the action of the air. Heat up to 98° appears to hasten and stimulate the action of all the other active agents; above 98° and up to 140° it has a killing effect.

"I use one third more rennet and less salt in spring than summer. The heating of the curd should be slow at first, gradually increasing as the whey forms on the outside of the curd; 98° is the usual heat in summer, but as the season advances the milk becomes richer, and I have found it necessary to heat to 102° in Scotland.

"*The great secret of good cheese-making is, that means must be used to expel the whey before acid is developed.* This is best done by stirring. Lactic acid must be allowed to develop in a very small degree only, so as to overcome the putrefactive ferment, and prevent the formation of gas in the cheese during the time of curing.

"The alcoholic acid, or the form of acid which develops by the exposure of the dry curd to the air at a temperature of 95° to 98°, takes from two to four hours' exposure of the curd to the free action of the air. This exposure is done by grinding the curd and stirring until it has the proper consistency, when it will feel soft and velvety. Curd should contain thirty-five per cent. of moisture when pressed, and thirty-three per cent. when cured.

"To determine and retain this proper proportion of moisture requires good judgment in the operator, the only guide being observation and common sense.

"Coarse salt is preferable to the fine kind, as the latter dissolves too rapidly, but it must be the best quality of salt that can be got."

HINTS ON CHEESE-MAKING.

From a paper read before the New York State Agricultural Society, January 21st, 1885, by George A. Bonfoy, of Herkimer County.

"To establish one set of rules for making cheese from all conditions of milk would be like recommending one remedy for all diseases of the human system. The quality of milk is very easily influenced by surrounding circumstances, both natural and unnatural; therefore the rule that would be beneficial to one kind of milk would be detrimental to another.

"I have adopted a few rules that I use in nearly all cases for making full cream cheese.

"First, warm the milk gradually to 83° in warm weather, and 85° or 86° in cold, using enough of sweet water-soaked rennet to coagulate in thirty-five or forty minutes, then cutting lengthwise and crosswise, letting it settle until the curd has entirely disappeared, after which stir and cut carefully to the desired fineness, stirring and warming to 98° or 100°, being governed by the keeping quality of the milk as to the length of time for heating. If the milk is sweet and the curd cooks slowly, then heat slowly, but if it cooks fast, then heat fast.

"The one-year-old cheese that took the prize at the New York State Fair last fall was made from full cream milk, and in the usual way, with the exception that it

was salted three and three quarter pounds of salt to one thousand pounds of milk, instead of two and one half; the curd was very fine-flavored, well cooked, and about half inch acid, and was not cheddared.

"Where the curds are well cooked, are free and not inclined to settle together, and sweet-flavored, I do not always consider it necessary to cheddar.

"It is sometimes difficult to know just when to salt and press the curd. We have to be governed by the condition of the curd, and whether it is intended for home trade or shipping.

"A great deal depends on having good milk to make good cheese. Too much pains cannot be taken in the care of milk.

"I find from personal experience and observation that there is a great difference in localities as to the quality of the milk.

"Where cows feed on wet, swampy lands that produce wild grasses, and have poor water to drink, the milk when made into cheese will be spongy and difficult to cook, of an offensive flavor, and when aggravated by tainted milk the curd will float on the surface of the whey.

"I know of no better way to manage such curds than to heat them in the usual way, and as soon as the acid begins to develop draw the whey, pack the curd, keep it warm, and if it turns spongy and full of pin-holes, then let it lie until a sufficient amount of acid has developed, so that when ground and pressed the pin-holes will have entirely disappeared.

"I have let such curds string from the hot iron five inches without any injury to the cheese.

"Such cheese when cured will be firm, meaty, and fine-flavored.

"Where cows fed on uplands have tame grasses to eat and running water to drink, the milk will be of better quality, and when heated will cook easier and be better flavored. Such curds do not require as much acid as the lowland milk.

"I am very much in favor of cheddaring cheese, especially in warm weather, for in our factory system, where we get a mixture of all kinds of milk, I consider it safer to draw the whey and let the acid develop on the dry curd. It takes the cheese a little longer to cure, but when cured the flavor is more durable.

"One mistake some of our factory-men are making is to make their cheese too quickly. The object is to get the cheese upon the market as soon as possible, so as to save care and shrinkage, and that the patrons may get the proceeds sooner.

"These are good arguments in favor of quick curing.

"Such cheese soon gets sharp and off flavor, and depreciates in value, bringing a loss to the dealers, dissatisfaction to the consumer, and a loss of our reputation abroad for the production of good cheese. Cheese-buyers are discriminating more closely now between good and poor cheese.

"Good cheese always finds ready sales at good prices."

MAKING WHOLE-MILK CHEESE.*

"After making all your apparatus clean and sweet strain the milk into your vat; it will be about the right temperature as it comes from the cow; add one ounce of annatto fluid coloring to three hundred pounds of milk, and one pint fluid extract of rennet, more or less, according to strength. Stir well, then let stand thirty minutes, only slightly agitating the surface of the milk to prevent the cream from rising; when a stiff curd is formed cut both ways with a curd knife; in ten minutes the whey will start; then gently and gradually heat to 100°, gently stirring and cutting with a curd knife until about as fine as wheat grains; draw off the whey, except enough to cover well the curd; when the curd has taken enough acid to 'hair' when applied to a hot iron it is ready to draw off the remainder of the whey; stir lively to prevent the curd from running together, add one pound of fine salt to forty-two pounds of curd, bandage and press forty-two hours, grease and remove to the curing-room, which should be kept at a temperature of about 55°."

COOLING MILK FOR CHEESE.†

"Last week Wednesday and a part of the night was fearfully hot, the storm howled, the lightnings blazed pretty continuously, and the rains poured.

"We got a little nervous in expectation that such a condition of the atmosphere would cause the milk to sour, and that Thursday we might expect trouble in the cheese vat. Not so. The patrons, taking note of scorching heat and flashing skies, did, no doubt, double duty in cooling their milk, and, to the surprise of all our cheese-makers, the contents of every vat were an hour longer in souring than is usual for moderate weather.

"This shows in an unmistakable manner what we have often tried to impress upon patrons, that it is themselves who are the prime factors in the making of a high quality of cheese; and it also shows that if milk can be safely kept on such a night as that, no night will probably come when it cannot be so kept.

"Another lesson it teaches, that more cooling, even in moderate weather, adds to the quality and quantity of the cheese made. Nothing wastes and devours milk like acid, and every added degree of coldness—in hot weather—the milk gets through care and attention, means added cash to the farmer."

GLOUCESTER CHEESE.

The "Encyclopædia of Agriculture," edited by John Chalmers Morton, gives the following description of the manufacture of cheese in Gloucestershire, England:

"The operation of milking the cows commences in summer at five o'clock in

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* F. M. Sexton, First Prize Cheese, Iowa State Fair, 1883.

† J. A. Smith, in *Cedarburg* (Wis.) *News*.

the morning, again at three in the afternoon, and is completed in about one hour each time, nine cows being allotted to each milker, the dairymaid usually assisting.

"As soon as the milk is drawn it is carried to the dairy-house, strained into the cheese tub, and the rennet and annatto mixed with it. The rennet is prepared in several different ways.

"In Gloucestershire the cleaned stomach of a calf is salted, and pickled, and dried; and when at least a year old it is well sodden in salt water, half a pint of which becomes enough to coagulate fifty gallons of milk.

"In autumn and winter, when the weather is cold, a small portion of the milk is warmed in a tin pan or pitcher, in order to bring the whole to the proper temperature (85°) before adding the rennet. The milk is then allowed to remain perfectly still for an hour, and during all this time it is kept carefully covered with a woollen cloth, to exclude currents of cold air. If all has gone well the curd will then be completely formed, and ready for being broken up.

"The breaking is effected by passing a three-bladed knife or a coarse wire sieve gently downward to the bottom of the tub. After the curd has been cut through and subdivided as equally and minutely as its suspension in the whey will admit of the whole is allowed to remain undisturbed for ten minutes or so, in order that the broken curd may sink sufficiently to allow the whey to be bailed off the top. As soon as all the *clear* whey has been removed, the curd, now much more condensed, is broken a second time, but much more slowly than before, to avoid pressing out any of the butter—which would undoubtedly occur were the cutting of the curd to be done roughly or rapidly. When the curd has been properly broken and reduced to an equal degree of fineness, it is allowed to settle for a short time, after which more of the whey is removed and poured through a sieve, to retain any small particles of curd that may still be suspended in it. When the most of the whey has been removed in this way the curd is divided into lumps, and laid aside one upon the other, in the bottom of the tub, which, being placed a little atilt, allows the whey to escape to the lower side, and be removed.

"When the whey has ceased to drain off, the curd is ready for being placed in the vat.

"A cheese cloth, made of fine canvas, is spread across the mouth of the vat; the curd is then lifted from the tub by the hands, and laid upon the cloth, and pressed equally down. When all the curd has been placed in the vat the ends of the cheese cloth are tucked up and folded inward, with as few creases as possible on the top, and covered with a circular board, made exactly to fit the inside of the vat. It is then put in the press for half an hour and lightly pressed, after which the partially consolidated curd is taken out, cut in slices, and passed through the curd-breaker, which reduces it to small crumbs, without squeezing out the fatty matter.

"The comminuted curd is again returned to the vat, and firmly pressed into it

by the hands while filling. A dry cheese cloth is then spread over the mouth of the vat, which is then turned upside down, and the curd turned out upon the cloth. The vat is now rinsed with whey, and dried, and the curd, still in the cloth, placed in it. The ends of the cloth are then folded neatly and evenly over the top, as before, and covered with the cheese board, or another cheese vat, if more than one cheese is to be placed in the same press. The vat is allowed this time to remain two hours under the press, when it is again taken out, and the cheese, now in a fine, solid state, is pared at the upper edges if necessary, thereafter inverted, and put in a clean dry cloth, and again pressed. There are usually two or three presses employed, each heavier than the other, and ordinarily it takes about four or five days for a cheese to go through these presses, beginning with the lightest and ending with the heaviest.

SALTING.

"After the cheese has been twenty-four hours in the press it is ready for receiving the salt; but some apply the salt in twelve hours. As a general rule, the salt should not be applied until the skin of the cheese is firm and free from openings, as these openings never close completely after salting, however great a pressure may be applied. The salting is effected by the hand, the salt being rubbed over the whole surface of the cheese as long as it continues to take it in, after which it is again wrapped in a dry cloth, and put under the press.

"In another twenty-four hours it is again salted as before; but this time it is put in the vat, without a cloth, and pressed, in order that a smooth and even surface may be obtained.

"A third and final rubbing with salt is given at the same interval, and the cheese being pressed as before, it is then ready for being removed to the drying-room. When cheeses are salted in this way it takes one pound of salt to thirty-two pounds of cheese.

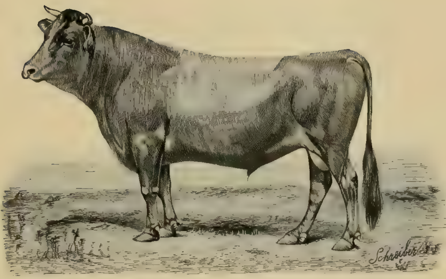
DRYING.

"A dry-room or loft is, or should be, specially appropriated to the drying of cheeses. The cheeses, as they are removed from the press, are laid either upon shelves, racks, or the floor, and are well wiped with dry cloths, and turned every twelve hours for two or three days. After this they are only wiped and turned every twenty-four hours, and in a month after leaving the press they are ready for being scraped and painted, the latter operation being performed only when the cheeses are intended for the London market.

"The paint employed is either Indian red or Spanish brown, or a mixture of both with small beer, which is rubbed on with a woollen cloth.

MARKS OF GOOD GLOUCESTER CHEESE.

"'The blue coat which rises through the paint on their sides, and, what is a sure sign of their richness and sweetness, the yellow, golden hue of their edges, a smooth,



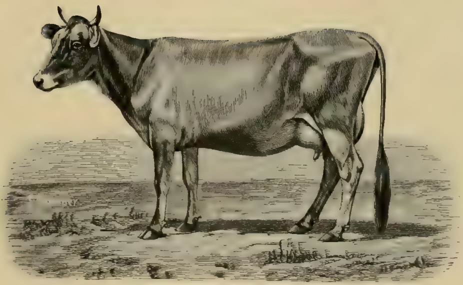
RIOTER'S COMBINATION 10,363.

AT 5 YEARS OLD.

Stoke Pogis—Marjoram—Pride of Windsor Type.

HIGHLAND HERD.

JAMES N. SMITH, LITCHFIELD, CONNECTICUT.



CARETA 19,092.

AT 2 YEARS OLD.

Stoke Pogis—Marjoram Type.

HIGHLAND HERD.

JAMES N. SMITH, LITCHFIELD, CONNECTICUT.

close and waxlike texture, a very mild and rich flavor, not crumbling when cut into thin slices, nor parting, when toasted, with the oily matter they contain, but softening without burning.' If cheese has been soured in the making, either from being too long in hand or from want of attention in scalding the utensils, nothing will cause it to assume the blue coat. 'If the curd is salted when ground down, before being put in the vats, the salt has the effect of giving a skin to each of the particles of the curd it comes in contact with, which prevents them from intimately uniting; and although the curd may be pressed together and become good cheese, yet it never becomes a close, smooth, solid mass, like that which is salted after it is made, but is of a loose texture, and crumbles when cut; and although it may be equally fat, yet in toasting the fat melts out of it, and the cheesy part burns.'

BUTTER-MAKING.

"The quantity of cream butter in dairies where cheese of the best quality is made is very small. About one fifteenth part of the milk is allowed to remain one meal, or twelve hours, when it is skimmed immediately before the making of the cheese commences, and of which it forms a part, along with that newly brought in from the cows. The cream taken from this small portion of milk is shifted once a day from one vessel to another (to prevent a skin forming on its surface, which is considered to injure the quality of the butter), and churned twice a week. The *whey* cream is also churned twice a week, but it is allowed thirty-six hours to rise before being skimmed off. The quantity of whey butter averages weekly about one pound per cow during the summer months.

"Mr. Morton gives sixteen pounds of cream butter and twenty-five pounds of whey butter as the average annual produce per cow on a large dairy farm in the vale of Berkeley.

DAIRY UTENSILS.

"The dairy utensils employed in Gloucestershire vary little from those used in other counties.

"They consist of the *milk-pail*, the *cheese tub*, the *sieve*, the *cheese vat* and *circular board*, locally called 'suity boards,' *skimming dish* and *bowl*. The milk-pail is made of maple, and will hold about six gallons. The cheese tub is of a size sufficient to hold the milk from which a cheese is to be made. The cheese vats are made of elm, turned out of the solid, and are of various sizes. For 'double Gloucester' (five cheeses to the hundredweight), the vats are fifteen and one half inches in diameter by four and one half inches deep; and for 'single Gloucester' (eight cheeses to the hundredweight), fifteen and one half inches diameter by two and one half inches deep.

"The only difference in the manufacture of the two kinds is that arising from the size of the article; and the only difference of quality is owing to the longer period during which the thicker cheese must be kept in order to ripen.

CLEANLINESS.

"The greatest attention is paid to cleanliness in the Gloucestershire dairies. The floor is kept as dry as possible, and the temperature as uniform as circumstances will admit of. The proper temperature is considered to be about 60°, but this is seldom attained in winter and spring."

GRUYÈRE.*

"Of all foreign kinds of cheese the Gruyère is probably the best known. The familiarity of the consumer with the produce is not, however, accompanied by an exact knowledge of the process of its manufacture; and I have heard the most amusing descriptions given by people who assume the air of being well-informed on such subjects.

"As an illustration of the prevailing ignorance I may quote the following description of Gruyère from one of the favorite text-books still used in the elementary private schools: 'Gruyère—made in a small town in Switzerland, in the Canton of Fribourg. It is a mixture of goats' and ewes' milk, and has a very strong flavor.'

"Although the Gruyère is of Swiss origin, is in many places known as 'Swiss cheese,' and is manufactured extensively in Switzerland, in France alone the value of Gruyère cheese, made annually, is estimated at more than $3,000,000.

"Owing to differences in the physical and economical conditions of the districts in which it is manufactured, there are many variations in the size and quality of the cheese, as well as in the arrangements under which it is made, cured and marketed. It would require a lengthy treatise to enter into all these details, and I therefore propose to confine myself to a brief description of the making of the cheese as I saw it done at M. Le Comte's factory, near Montereau, about fifty miles south of Paris.

"Gruyère cheeses have a sort of cart-wheel shape; thin cylinders of large diameter. In weight they vary from under half a hundredweight to three times as much.

"M. Le Comte has four cheese-tubs placed round a central pillar in the middle of his cheese-room. Each tub holds nearly seventy gallons of milk, and is heated by means of steam injected into a coil of pipes in the space in the false bottom. The whey is drawn off by means of a syphon, and runs through pipes into one of three whey tanks, which have a total capacity of nearly nine thousand gallons. One man has charge of each tub, and if the supply of milk is sufficient he can make five cheeses per day.

"Each cheese is numbered, and also branded with the distinguishing mark of

* Extract from a lecture on Dairy Interests Abroad, by F. B. Thurber, at International Dairy Fair, New York, 1879.

the dairyman, who receives a bonus for each really good cheese that he makes, in addition to his daily wages.

"The milk, measuring as nearly as possible sixty-six gallons, having been put in the tub, the temperature is raised to 95° Fahr., when about twenty-one ounces of rennet are added and carefully mixed with it, and the tub is covered.

"The curd comes in about forty minutes, and the whey is then raised to a temperature of from 138° to 140°, at which it is kept for another forty minutes to cook the curd. Toward the end of this period a large flat wooden shovel is placed carefully upon the top of the curd, the progress of which is now and then tested by the attendant gently moving the shovel over its surface. If the shovel sticks or hangs to the curd, the cooking process is still incomplete; but when it glides smoothly along, the attendant commences cutting the curd gently into horizontal slices, which he removes toward the rim of the tub. After this has been done sufficiently, in his judgment, he uses one of various forms of curd-breakers. Amongst others, I noticed a wooden pole armed with a number of projecting slanting spikes, which cross one another along about two feet of its length. Great practice appears to be necessary in order to acquire skill in this part of the operation, and the object in view appears to be to break up the curd as evenly but as ruggedly as possible. Toward the end of the breaking the dairyman, by varying the movement of the breaker, collects all the curd into the centre of the vat, and then allows a few moments for the rotatory movements of the whey to subside.

"He then takes a cloth, puts one corner between his teeth, holds the lateral corners in each hand, holding at the same time a curved iron wire over which the remaining corner of the cloth is folded. He then bends over the cheese-tub, and by deftly passing the wire completely under the heap of curd collects it all in the cloth. The clothful of curd is then taken out and placed in a frame the size and shape of the cheese, the ends are carefully folded over the top of the mass of curd, a board is put on, and the cheese submitted to pressure for twenty-four hours, in the course of which it is turned seven or eight times. After pressure it is rubbed with salt and transferred to a cellar, where it is turned and rubbed every other day for about three months, when it is fit for market."

STILTON.*

"Stilton cheese, manufactured chiefly in Leicestershire, is made from full milk, sometimes enriched by the addition of cream, and the curd hardens into cheese without pressure. The cream of the night's milk is added to the new milk of the morning, and the rennet is mixed with it when the whole is at a temperature of

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* Extract from a lecture on Dairy Interests Abroad, by F. B. Thurber, at International Dairy Fair, New York, 1879.

84° Fahr., enough being used to make it coagulate in an hour and a half. If it comes sooner it will be too tough.

"The curd is not drained of its whey in the ordinary manner, but is removed in slices with a skimming-dish, and placed upon a canvas strainer, the ends of which, when it is full, are tied up and the whey gently pressed out.

"It is then allowed to drain until the next morning, when it is removed and placed in a cool dish, whence, cut in thin slices, it is put in a hoop made of tin, about ten inches high and eight inches across, and pierced with holes. A clean cloth is placed within the hoop, and as the slices are laid in a small quantity of salt is sprinkled between the alternate layers. It remains in the hoop covered up but without pressure. Next day the cheese is taken out of the hoop and clean cloths are applied, after which it is inverted and replaced, and pricked with skewers through the holes of the tin hoop, to facilitate the extraction of the whey. In four or five days the curd becomes firm. During this consolidating process the cheeses are kept in a place where the temperature can be maintained at about 100° Fahr. When the cheese has become firm enough it is firmly bound up in a strong fillet of canvas, wrapping it around several times. The binders and cloths are removed every morning; cracks are filled up with curd, and ultimately the coat becomes hardened, and the cheese is removed to the curing-room.

"Here they remain for several months, during which time they are turned frequently, and acquire a rough, firm rind, different from any other variety.

"A Stilton cheese when ripe and in condition for use is rich, soft, creamy, and generally becomes slightly mouldy, the moulding evenly being facilitated by pricking it in several places with a sharp-pointed bodkin, a little larger than a knitting-needle, about twice a week; this is to admit the air a little, and in these places it soon begins to mould. The curing-room or cellar should have an equable and uniform temperature, and the cheese should be kept carefully brushed to keep out the mites which are apt to infest the rough coat or rind. Stilton cheese sells readily at high prices in England, wholesale quotations ranging from twenty to twenty-five cents a pound, and it would probably pay some of our enterprising American dairymen to experiment in making Stiltons until they succeed in turning out an article as closely resembling the original as they have in the Cheshire and Cheddar styles."

Soft Cream Cheese.

CAMEMBERT.*

"Of all the soft kinds of cheese made in France, the Camembert, when properly manufactured, is no doubt the king. Its rivals are the Brie and the Coulommiers, but the more unwieldy shape and shorter season of the former, and

* Extract from a lecture on Dairy Interests Abroad, by F. B. Thurber, at International Dairy Fair, New York, 1879.

the restricted manufacture of the latter, deprive their competition of any serious importance.

"On the other hand, the popularity of the Camembert has so increased the demand that many of the smaller and especially of the newer makers take too much toll in the shape of cream before they commence the process of cheese-making, and thus tend to kill the goose that lays the golden eggs. When properly made the Camembert quite deserves the eulogium passed upon it by the Reporter of the Jury at the Paris Dairy Show, in 1874: 'It surpasses in delicacy everything that the ingenuity of the cheese manufacturer has been able to invent to flatter the most fastidious palate.'

"This result cannot, however, be obtained without great care, some experience, and a most watchful attention to the details of the process of curing.

"Many of the successful makers of this kind of cheese believe that they possess a valuable secret in their method of procedure, and not unnaturally are averse from giving technical information to a possible competitor, or ever to an outsider. I visited several Camembert dairies, which are generally situated in the Pays d'Auge, although there are some also in Le Bessin; but I have found it necessary to discard my notes on all but three dairies—namely, one in La Bessin, near Isigny (that of the Marquis de Cussey de Jucoville), and two in the Pays d'Auge, that of M. Paynel, at Mesnil Mauger, near Lisieux (whose grandmother first made this kind of cheese in 1791, at Camembert, in Orne), and one near Livarot, where I was taken by that disinterested and enthusiastic pioneer of agricultural progress, the Viscount de Neuville, President of the Société d'Encouragement de Lisieux.

"Even in these dairies there are differences in the details of the various processes of making and curing, and it must frankly be admitted that Camembert cheese-making is still a 'rule-of-thumb' procedure, and has not yet been reduced to scientific principles.

"The cows are generally milked three times a day—at 4.30 A.M., 11.30 A.M. and 6 P.M. In most dairies the evening's milk is lightly skimmed in the morning, after having stood twelve hours, and butter is made with cream. The skimmed milk is divided into two portions, one of which is added to the morning's and the other to the midday's milking. The mixture of two thirds whole and one third skim-milk is immediately put into earthenware vessels, holding from about twelve to fifteen gallons each, and sufficient rennet is added to make the curd fit to be transferred to the cheese-moulds in about three or four hours, or perhaps after a longer interval in winter.

"It should be mentioned that, before adding the rennet, the milk is brought to about the temperature it is supposed to have had after being drawn from the cow, or about 86° Fahr. After adding the rennet its mixture with the milk is insured by a gentle stirring, and the pots are then covered with a square board.

"The curd is known to be ready for removal when it does not adhere to the back of the finger placed gently upon it, and when the liquid which runs off from the finger is as nearly as possible colorless.

"When ready the curd is carefully transferred, without breaking it more than is possible, to perforated moulds, of the same diameter as a Camembert cheese (say four inches), and about three times the height; or others use a mould about three inches high, and prefer to add new curd from time to time, as the first shrinks from drainage of the whey. The moulds are placed on reed mats, resting on slightly inclined slabs made of slate, cement, or other hard material, and having a gutter near the outer edge. The curd remains in the moulds from about twenty-four to forty-eight hours, according to the season, being turned upside down after an interval of from twelve to twenty-four hours—that is to say, when sufficiently drained at the bottom. After the turning the face of the cheese that is then inside the moulds is sprinkled with salt, and about twelve hours afterward the opposite face and the rim of the cheese are also salted. The cheeses are then placed on movable shelves round the walls of the dairy for a day or two, according to the season and to the capacity of the room, in relation to the number of the cheeses made daily; and thus ends the first stage in the manufacture of this renowned dairy product. It must be understood, however, that the above description is merely general, and that each maker knows by experience how much rennet of an ascertained strength he should add to the milk; how long the curd takes, under different circumstances of weather, to become fit for putting into the moulds; how large the perforations in the moulds should be; how long the cheeses should be left to drain in the moulds; how often they should be turned; how much salt should be used, and so on through the whole processes which constitute the manufacture and the curing of the cheese.

"The curing of Camembert cheese consists of two distinct stages. In the first stage the cheeses are placed in a thoroughly well-ventilated room ('drying-room'), on shelves made of narrow strips of wood, having narrow intervals between them, or of ordinary planks, covered with reed mats or clean rye straw. The great point is to secure as dry an atmosphere and as equable a temperature as possible, and the greatest ingenuity is exercised in efforts to attain these objects. Generally the windows are numerous and small, placed at different heights, and furnished with three fittings: viz., glass to exclude air, but not light when the glass is shut; with a wooden shutter, to exclude both light and air; and with a wire-gauze fitting, which will admit both light and air, but will exclude flies and all kinds of winged insects, which are the great bane of the soft cheese curer.

"The cheeses, as a rule, are turned every day at the commencement of their curing, and every other day afterward while they are in the drying-room, except in damp weather, when daily turning is necessary. During the sojourn in the drying-room the cheeses show the following succession of appearances: after an interval of

three or four days they become speckled; in another week they are covered with a thick crop of white mould; by degrees the color of this mould deepens to a dark yellow, while the outside of the cheese becomes less and less sticky. At the end of about a month, when the cheese no longer sticks to the fingers, it is taken to the finishing-room, where light is nearly excluded, and where the atmosphere is kept very still and slightly damp. Here they remain for three or four weeks, being turned every day or every two days, according to the season, and carefully examined periodically. When ready for market—that is to say, in winter when they are ripe, and in summer when they are about half ripe—they are made up into pockets of six, by means of straw and paper, with a skill and tidiness worthy of the reputation of the cheese.

"The prices of Camembert cheese vary very much according to quality and season. A really good cheese should have a mottled external appearance, the colors being a reddish brown and a dirty yellow, the former predominating. If the color is too bright it betokens a skim cheese, as also does an elasticity or toughness when the cheese is pressed on the face with the finger. The quantity of milk required to make a Camembert cheese varies a little, according to its richness in cream when used for cheese-making. Thus the Marquis de Cussey de Jucoville, who has a dairy of thirty cows near Isigny, makes eight cheeses from twenty-four and one half pints of milk, or about three pints of milk to a cheese, but he takes off no cream. He sells them at from $1.50 to $1.60 the dozen; and, assuming that his cows (which are remarkably good ones and graze on some of the best pastures of Normandy, having a rent value there of nearly $25 per acre) give an average of five hundred and fifty gallons, their gross return in cheese alone would be $180 per head per annum, if it were all made into Camembert."

JERSEY CHEESE.

In the progress of time the thoroughbred Jersey and Jersey grades will push all other breeds of dairy cows out of sight in this country. The chemical and the practical analysis of Jersey milk, as well as the practical use of the milk for human food by children or adults; the production of sweet cream, superior butter and rich cheese—all demonstrate beyond any question that the Jersey is the best breed in existence. It is better to have a breed, I repeat, like the Jersey, which produces a large quantity of milk rich in solids, condensed milk, than the Dutch (Holstein) that yields a larger secretion of highly watered milk.

The Jersey, not yet having supplied the demand of the breeders for seed stock for butter dairies, has been but seldom tested for cheese. But the time is coming when a choice, luxurious cheese made from Jersey milk will bring the highest price in the market, rivalling the French Camembert and other fancy cheeses in quality.

Very little cheese has been made upon the Island of Jersey because of the

demand for butter. Mr. Quayle says: "It was anciently thought that cream from the Jersey cow was too rich for making cheese. Mr. Le Feuvre, of La Hogue, tried the experiment and succeeded to admiration. It was made from the pure milk, cream and all, as it comes from the cow. It was found that the quantity of milk that would have produced a pound of butter afforded one and one half pounds of cheese. From the quantity of milk which produced a cheese of about twenty pounds weight, the drainings of the curds and whey, on being churned, yielded four pounds of butter. This butter was of an inferior quality when eaten with bread, but was superior to any other for the making of pastry; it was peculiarly hard, and of excellent texture for such use in hot weather. The writer has tasted cheeses from Mr. Le Feuvre's farm quite equal in quality to the richest 'Double Glo'ster.'"

A correspondent of the *Country Gentleman* for March 27th, 1884, in writing of the "Beauty and Quality in Jerseys," says: "When the temporary economies of the dairy demand the cessation of butter-making the Jersey's milk furnishes cheese the rival of the finest Stilton or Roquefort.

"Dr. Grant's 'whole Jersey milk' makes a cheese in July and August, while many of his special butter customers are at the seaside, which is snapped up in the market at thirty-five and forty cents a pound so rapidly as to render it impossible to buy it ripe enough for fair appreciation."

The richness of Jersey milk renders it peculiarly applicable to the making of cheeses of such types as the Stilton and the Camembert, while by removing from one third to one half of the cream by the centrifuge the remainder of the milk will be rich enough to make the first quality of Cheddar or Double Glos'ter.

Again, let it be enforced upon the memory to use none but *pure, well-prepared rennet.* Good rennet rightly used produces good, stable, rich curd; it prepares the way for a good "cure," and finally for good quality, fine flavor, ready sales and fair profits. It is easy to him who understandeth to make good cheese with good rennet, having, of course, good milk. Bad rennet and artificial rennet make bad cheese. Bad cheese cannot be mended.

QUALITY OF JERSEY CHEESE.*

"The business of the Jersey cow is emphatically that of butter-making. Her milk, however, is rich in cheesy matter, and, contrary to the general belief, if I may judge from samples of cheese from Jersey milk which have been sent me from Maine, is capable of making as fine cheese as it does butter. It requires less milk to make a pound of cheese than it does of the milk of natives—about eight of milk to one of cheese. It is a new feature worthy of note in the uses of this breed

* L. B. Arnold, "American Dairying."

of cattle that their milk can, without the waste of buttery matter, be converted into a strictly fancy cheese, and as rich in fat as Stilton. Analyses of cheese from pure Jersey milk recently made at Cornell University have shown over forty per cent. fat."

JERSEYS AS CHEESE-MAKERS.*

"That the Jersey cow is 'queen of the churn' is generally admitted, but little has been said in the public press as to her qualities as a cheese-maker in comparison with other breeds that assume to have a special 'corner' on the cheese industry.

"That the facts warrant the very strongest claims being made on behalf of the Jersey in this respect has been most completely demonstrated by a series of very exhaustive and comprehensive dairy tests conducted at the Ontario Experimental Farm, by Professor William Brown and Professor Barre, the latter in charge of the practical butter-making department of the Ontario Experimental Farm. The tests began in the month of December, 1884, and were continued into July, 1885. The tests were made weekly. The number of breeds embraced therein was twelve. Below is set out the result:

THE ONTARIO EXPERIMENTAL FARM DAIRY TESTS. SEASONS 1884–1885.

Sources.	Milk per Season. Estimate.	Cream. Per cent.	Butter per 100 lbs.		Cheese Curd per 100 lbs. of Milk.
			Milk.	Cream.	
Holstein	7,000	11.9	2.4	34.5	10.9
Ayrshire	6,000	16.9	4.5	43.5	12.9
Ontario Grade	5,000	9.5	4.4	41.6	12.2
Shorthorn Grade	4,500	16.8	3.7	46.3	14.9
Guernsey	4,000	16.1	2.5	44.5	12.7
Quebec Grade	3,600	14.0	3.4	52.9	13.9
Jersey	3,500	19.9	5.1	55.0	15.6
Shorthorn	3,000	17.2	4.3	48.5	14.0
Devon	2,800	11.6	3.7	51.2	11.9
Galloway	2,500	11.8	2.3	34.0	11.7
Aberdeen Poll	2,300	12.8	3.5	28.0	10.1
Hereford	2,000	....	....	....	....
Averages	3,800	14.3	3.6	43.4	12.8

* Valancey E. Fuller, in *Jersey Bulletin*.

CHEMICAL ANALYSIS OF MILK.

Sources.	Fat.	Solids other than Fat.	Water.	Total Solids.
Jersey	6.62	8.03	85.35	14.65
Ayrshire	5.72	7.81	86.47	13.53
Shorthorn	4.99	9.00	86.01	13.99
Ontario Grade	4.65	8.60	86.75	13.25
Galloway	4.68	9.90	85.72	14.28
Devon	4.13	8.02	87.35	12.15
Quebec Grade	4.08	8.77	87.15	12.85
Shorthorn Grade	4.03	8.55	87.42	12.58
Holstein	3.73	8.15	88.12	11.88
Guernsey	3.60	8.20	88.20	11.80
Aberdeen Poll	2.87	8.70	88.43	11.57
Averages	4.44	8.54	87.02	12.98

"It will be noticed the quantity of milk is estimated, and I am satisfied, according to my experience and that of other Jersey breeders to whom I have spoken on the subject, that Professor Brown credits the Jerseys with at least one thousand pounds too little milk. At Oaklands we sold and bought a good many cows last year (1884). Most of those sold were amongst our heaviest milkers. Those that remained a whole year on Oaklands, including heifers, by actual daily weight of night and morning, averaged 6382 pounds per head. That this is more than an ordinary average for a Jersey herd I admit, but in placing it at 4500 pounds per head I feel that, if anything, I am giving them credit for too little, as the Jersey cow is known to be most persistent in her milking.

"In the 'dairy tests' it will be noticed that the respective positions occupied by the three breeds—Jerseys, Ayrshires and Holsteins—are as follows: Jerseys first, 19.9; Ayrshires third, 16.9, and Holsteins eighth (out of 12), 11.9, or a difference of eight per cent. in favor of the Jersey. In butter per one hundred pounds of milk: Jersey first, making 5.1 pounds of butter out of one hundred pounds of milk; Ayrshire second, 4.5 pounds to one hundred pounds of milk; and Holstein tenth, 2.4 pounds of butter to one hundred pounds of milk, it taking over forty-four pounds of Holstein milk to one pound of butter. When we come to consider the cheese curd per one hundred pounds of milk, it is natural to expect that the Holsteins and Ayrshires, for whom special claims are made in this respect, would 'beat the Jersey clean off her feet,' but we find that when we come down to actual

competitive tests the Jersey leads all other breeds, and distances the Holstein, the Jersey standing first, 15.6, the Ayrshire fifth, 12.9, and the Holstein tenth (out of 12), at 10.9.

"By chemical analysis of milk the Jersey leads in fat, followed close up by the Ayrshire, with the Holstein tenth, 3.73. In 'solids other than fat' the Holstein leads the other two breeds, the Jersey and Ayrshire, the Galloway standing first, but the two last-named being at the bottom of the lists. In 'total solids' the Jersey leads, 14.65, the Ayrshire fourth, 13.53, and the Holstein ninth, 11.88. Judging on the basis of these tests, the Jersey must be admitted as being the best butter and cheese cow per one hundred pounds of milk of all the various breeds, and if for the production of that milk she requires less food, she is the most economic and the best cow for the average dairyman, and it must be a source of congratulation to Ayrshire men to see how well their favorite breed has stood these searching comparative tests.

"It might be claimed that the Jerseys, Holsteins and Ayrshires employed at the Experimental Farm were not fair representatives of the breeds. I know the Jerseys at the farm, and know them to be below, not above the average. Unfortunately for this contention, so far as it might be used against the Jersey, a series of prizes were offered for milk, cheese and butter combined at the Provincial and Dominion Exhibition held at London, and the Industrial Exhibition held at Toronto, both in this month of September.

"At London no competition was entered into directly between the breeds, but the same rules and score of points were applied to each. The rules are those adopted in England and Scotland in adjudicating upon the best milkers. Each cow was milked out in presence of Professors Brown and Barre, or their assistants, the night before the test began; twenty-four hours' milk was taken. The scale of one hundred points, according to which the samples were to be adjudicated, was as follows: (1.) Weight of milk; one point was allowed for every pound's weight given in twenty-four hours. (2.) Butter per one hundred pounds, three pounds, decimal five being the standard in Canada (in England it is but three pounds); to every one hundred pounds milk ten points were added or deducted for every one per cent. above or below. (3.) Cheese curd; one point was allowed for every pound. (4.) Time since calving; add one point for every ten days.

"But two Jerseys were entered at London, both from my herd. Eight Holsteins competed, three Ayrshire and two Shorthorn grades, and with the following results, arranged according to their order:

Breed.	Age.	Time after Calving.	Milk per Day.	Butter per 100 lbs. Milk.	Wet Cheese Curd per 100 lbs. Milk.	Total Value.	Order of Merit.
Jersey	6 yrs.	114 days.	24.12	8.81	20.60	109.22	1st
Ayrshire	5 "	138 "	29.50	5.43	21.25	83.85	2d
Shorthorn Grade	7 "	129 "	46.80	3.62	20.62	81.52	3d
Jersey	5 "	86 "	27.00	5.75	20.00	70.10	4th
Ayrshire	8 "	161 "	18.12	4.53	23.75	68.27	5th
Holstein	6 "	207 "	25.37	3.36	19.62	64.29	6th
"	7 "	153 "	28.80	3.31	16.87	59.07	7th
Shorthorn Grade	6 "	145 "	24.25	3.12	20.62	55.57	8th
Holstein	4 "	116 "	35.00	2.81	15.60	55.30	9th
"	5 "	113 "	37.60	2.75	11.25	52.65	10th
"	2 "	83 "	26.25	3.62	16.05	52.62	11th
"	2 "	133 "	30.90	2.37	19.37	52.27	12th
Ayrshire	3 "	79 "	25.90	2.75	23.12	49.42	13th
Holstein	3 "	109 "	23.60	2.65	20.00	46.00	14th

"By this the Jersey cow Rose of Eden made the greatest count that I am aware has ever been made at a public competition of this nature, beating the second by over twenty-five points. The weather was extremely cold, and there had been considerable rain, sheds bad, without any flooring, and our cows had decreased very materially in their flow of milk, as I presume others had. The richness in butter fat of the milk of Rose of Eden, it taking less than twelve pounds of milk to one pound of butter, is in striking contrast to that of the other breeds, the average of the Holsteins requiring over thirty-three pounds of milk to every pound of butter, and the average of the Jerseys less than fourteen pounds of milk to every pound of butter. The Jerseys at the London Exhibition were about one to every three Holsteins, and some of the Holsteins had very large reported tests for milk. Rose of Eden is not by any means one of our best cows for butter, and the other Jersey has never been tested for butter.

"The average net curd to one hundred pounds of milk was as follows: Ayrshire, 22.7; Jersey, 20.30; Holstein, 16.46; Shorthorn grade, 20.02; but it must be borne in mind that two Holsteins were two years old only. It will be noticed that the Shorthorn grade excelled all in milk, and excelled the Holstein in butter and cheese.

"At the Industrial Exhibition at Toronto, under the same judges and same mode of judging, the breeds were brought into direct competition with each other. After

their experience at London, the Holstein breeders, though making a large show of cattle at Toronto, failed to 'toe the mark' in another public competition, though I am not aware that they were averse to the mode of judging prior to the London competition. The result was as follows, arranged according to merit: first, Jersey; second, Jersey; third, Jersey; fourth, Ayrshire; fifth, Jersey; sixth, Jersey; seventh, Jersey; eighth, Devon; ninth, Ayrshire; tenth, Ayrshire. The average of cheese curd was in favor of the Jerseys, and the butter per one hundred pounds was largely in favor of the Jersey.

"It has for a considerable length of time been contended by the enemies of the Jersey that they could not stand public competition in the hands of parties outside of the Jersey interest. To meet that objection, one of the committee of testers in Mary Anne of St. Lambert's great test was a Shorthorn man, and no greater refutation of this charge can possibly be given than has been administered by these competitive tests, and by the series of carefully conducted tests of Professor Brown and Professor Barre, set out in the earlier part of this letter. On the contrary, they are the strongest corroboration of the claim made by the Jersey as to their butter-giving powers, and show that the only trouble with Jersey breeders has been that they have been too modest in not claiming her as the greatest cheese cow to a given quantity of milk, as she has amply, in the most public manner and in the hands of thoroughly disinterested experts, shown herself."

ANALYSIS OF CHEESE.

From Arnold's "American Dairying."

Cheese made from pure milk of Jersey cows:

Water.	Fat.	Ash.	Protein.
28.11	41.03	2.68	28.18

Cheese made from Jersey milk mixed with equal quantity of common milk:

Water.	Fat.	Ash.	Protein.
30.49	39.25	3.00	27.06

The Jersey makes the most cheese, of the best quality, her only competitor being the Guernsey breed of cows.

ANALYSIS OF CHEESE.

From Flint's Treatise on "Milch Cows."

	Water.	Fat.	Ash.	Casein.
Full-Milk Cheese................	38.46	31.86	8.81	25.87
Skim-Milk Cheese................	43.82	5.98	5.18	45.04
Margerine Cheese....	40.56	20.53	7.05	34.86

ANALYSIS OF ENGLISH CHEESE.

By Mr. Jones, in Laboratory of Professor Johnston.

	Water.	Casein.	Fat.	Ash.
Double Gloucester, one year old	35.81	37.96	21.97	4.25
Cheddar, two years old	36.04	28.98	30.40	4.58
North Wilts, one year old	36.34	31.12	28.09	4.41
Dunlop, one year old	38.46	25.87	31.86	8.81
Skim-Milk, one year old	43.82	45.04	5.98	5.18

Cheese, according to Lyon Playfair, is considerably higher in its nutritious elements than the flesh of animals, and is composed as follows:

Water	38.78
Flesh-forming substances	31.02
Heat-giving substances	25.30
Mineral matter	4.90

JERSEY BUTTER.

"Didst thou never see a Titan kiss a dish of butter?"—*Shakespeare.*

Next to sweet cream of the richest quality and perfect purity, golden Jersey butter, when made according to the perfect art, is the crowning luxury of the table, and no bill of fare is quite complete without such butter.

A perfect specimen of Jersey butter, even if it is sold as high as one dollar a pound, is hard to find, and very few people know how to make butter worthy of the name of Golden Jersey.

Good butter has qualities that ought to be made familiar to the sight, touch, smell and taste of every worker in the dairy.

The texture of butter, when made from a well-fed model Jersey, is a characteristic that every expert soon learns. There is a fine, waxy, almost crystalline grain, without any appearance of water following the cut of the knife; the color is like the glistening yellow of the blossom of the buttercup; the aroma delicate and refreshing, giving the true "smell of dairy," and suggestive of fields of white clover and poa; and the taste gives a suggestion of chestnuts and almonds. The butter has a soft, satiny touch, and melts upon the tongue with a delicacy like that of sweet cream or clover honey. It has no suggestion of buttermilk, no touch of oil or grease, gives no hint of salt; and, all-in-all, when once learned the excellencies of golden, waxy, aromatic, delicious, nutty-flavored Jersey butter are so superlatively satisfactory to the educated senses that it is a great deprivation to the lover of good housekeeping and wholesome fare to fail of a regular supply of this luxury.

The best butter can be drawn out in shape, like wax, a "plastic, fragrant gold," and is made from non-pregnant cows when, at the flush of milk, they are fed on a select, high-flavored ration of *mixed grasses, clover, shorts and maize meal.*

The very pinnacle of good butter-making is reached on that day when the cow does her level best in productiveness, provided the cow is in that state of perfect health wherein she can assimilate the food she eats, that food being the richest in quality and flavor. It matters not if her product be one pound or five pounds a day, as long as she is a healthy Jersey of typical quality.

TO BEAR IN MIND.

Formerly good butter was made accidentally once or twice a year, when the circumstances of pasture, temperature and weather were favorable; but now the best butter ought to be produced every day in the year. Much butter is ruined, in the process of milking, by the filthiness of the milker. The manipulation of materials in any dairy cannot be over-cleanly. Sweet-flavored butter cannot be made from a solution of cow-dung and the odor of horse-urine, or the dust and dandruff of the cow, or the tobacco-pipe of the smoker, or the saliva of the chewer, or the dirty tricks of the milker who dips his hand in the pail to moisten the udder and teats.

Butter is either good or bad; when it is good it is very good, but when it is bad it is horrid—it is too generally very bad in the dairies of our country. Good butter cannot be produced from cows that are not in normal health. A cow that is kept in a stable where the floor is dry and clean; where the sunlight floods all the place several hours; where there is a perpetual flow of sweet, pure air, the gutters cleansed and washed before each milking, and her feed the best, will make her best butter from one week after calving until her next gestation begins. The quality will fall off a little during the rest of her season.

The factors that militate against the production of good butter are too common—low, damp basements; non-ventilated hovels; close, dark sheds; filth; an air full of exhalations from skin and lungs, and vapors from dung and urine of hogs, horses and fowls; the dust of currying, brushing and sweeping, and endless combinations of disgusting filth.

If the milk of cows of all periods of gestation is mixed indiscriminately, and the cows drink impure water, and, in addition, are worried and chased by boys and dogs; if they are kicked and clubbed or pitchforked by savage and boorish men; if tormented by mosquitoes and flies—all the conditions are against the production of cream or butter, and the feed is worse than wasted.

To make good butter every factor heretofore mentioned must be well considered by the owner. He must have the best Jersey cows which he can procure,

and keep them with a care and affection that rivals the Arab's fondness for his horse.

With the best cows, best stable, best care, best food, pure water, CLEANLINESS IN THE STABLE AND IN THE DAIRY, the milk classified from *fresh cows*, *bred cows*, and from cows *near calving*, everything will be favorable for the display of skill in the art of butter-making.

METHODS IN BUTTER-MAKING.

There are not less than four distinct systems of treating milk in the manufacture of butter: 1. The centrifuge method. 2. The whole-milk churning. 3. The shallow-pan system. 4. The deep-can setting.

1. *The Centrifuge.*

The centrifuge method consists in treating the cream as drawn from the separator. It is the latest method in the preparation of cream for the butter dairy.

A saving of fifteen per cent. as the average net gain in the butter product for the centrifuge is a very large profit. When both butter and cheese are made in the same dairy the machine can be set so as to remove only a part of the cream, and that consisting of the largest globules from which the best butter is made.

When the cream is skimmed by the centrifuge it is of a high temperature, having the animal heat or a little less, and, whether used for sweet cream or for butter, needs to be speedily cooled to about 65° Fahr. According to numerous reports of trials at butter-making with centrifuge cream, the chief drawback has been the neglect of rapid cooling. Again, the after-treatment of the cream has not been perfectly understood, for it is very evident that the cream is of a different character to that by any other mode of setting, and must therefore require a special preparation for butter. The proper degree of ripening in cream, and the best method of securing it, has as yet no fixed rules. The ripening can be hastened by proper ventilation and aeration of the cream; by stirring at frequent intervals, and pouring from vessel to vessel slowly, to give contact with the air.

If all the directions for cleanliness under Milking are fully observed there will not be much more than 0.15 per cent. of dirt in the milk, the chief part of which will be effectually removed by the centrifuge, thus furnishing a cream sweeter, cleaner and purer than by any other system.

2. *Churning Whole-Milk.*

Next to the centrifuge, churning the whole-milk produces the greatest amount of butter from a given quantity; the butter is, however, of an inferior, caseous quality. By any system of setting, in order to make good butter requires a practical knowledge and skill in all that pertains to quality of breed and the particular qualities of

CANADA'S JOHN BULL 8388.

AT 2 YEARS OLD.

Stoke Pogis-Marjoram Type.

OAKLANDS HERD.

VALANCEY E. FULLER, HAMILTON, ONTARIO, CANADA.

individual cows in the herd and to methods of feeding and management; the nature and quality of milk and cream; sources of contamination; the absorption of odors and impurities; the special advantages of any and all systems of setting milk; proper temperature of milk, cream and butter at each and every stage of progress; the right churn and process of churning; the method of washing; the degree of working; the true philosophy of salting; the proper handling, printing and fitting for special customers.

The whole-milk needs to be quickly cooled. The ripening of cream is hastened through aeration. The temperature of the milk at churning needs to be about 62° Fahr.

Defects of the whole-milk system are very patent. There is a loss of the sweet skim-milk for calves, and a great amount of unnecessary labor is occasioned by the cooling and churning of an immense bulk of milk.

There is more waste in this method than any other, and the butter, containing more casein, does not keep so well.

3. *The Pan Method.*

The setting of milk in shallow pans is necessarily subject to greatly varying conditions, but when well conducted the results are very favorable toward the production of the best quality of butter.

The process of ripening cream is perhaps as favorable to success under well-conducted shallow setting as by any other method. Ripening of cream for butter-making, like the ripening of whole-milk in cheese-making, is something entirely different and apart from mere souring. The main factors in the ripening of cream are *oxygen and light, with a proper temperature.* Oxygenation is a process absolutely essential to ripen cream for the first quality of butter. So that cream spread out upon the surface of milk in strong light but not the direct sunlight, and in a pure, sweet atmosphere, at a temperature of 62° Fahr., needs only good churning, washing, salting and shaping to make perfect butter.

The pan system entails much work, and it needs more space than any other, and also good ventilation. There is a great loss of sweet skim-milk by the long time required for rising and ripening.

THE SPRING HOUSE.

There are those who think the spring house the most desirable form of dairy-house, whether the shallow-pan setting or some other be used.

The milk and cream rooms must be kept at 55° Fahr., well lighted, from the north or northwest side only, so as to avoid the direct rays as well as the heating power of the sun; clean and well ventilated, with a good concrete or marble floor, and suitable tanks or compartments, with ever-flowing spring water under perfect

control as to quantity and speed of flow. This abundant spring water helps to preserve the right temperature, and also aids greatly in removing the disagreeable animal odors of the milk, as the cool, moist air acts in the double capacity of absorbent and vehicle of removal in its outward flow.

This dispelling of odors greatly improves the flavor and keeping quality of the butter.

The cream also ripens well in the moist air, and does not become tough and leathery as in dry air or contact with a strong current of air.

4. *The Deep-Can Setting.*

The deep-can setting calls for a great and sudden reduction in the temperature of the milk in order to separate the cream in twelve hours. In this process the cans are deep and either entirely submerged or cooled at the top. This method produces about the same amount of butter as the pan system. The essentials in butter-making are rapid cooling of the cream to 50° or 55°; gradual return of the temperature of cream to 75° until ripe; a ripening of the cream by giving a broad surface to air and light; ventilation, with pure, sweet air; churning at the desired period of ripening, which may require twenty-four or more hours, the churn and the cream at from 62° to 64° during the churning.

VENTILATION.

The subterranean system of ventilation has proved advantageous in maintaining a uniformity of temperature, and is consequently well adapted to the butter and cheese dairy. The air is conducted through an underground shaft so far below the surface that the temperature of the earth at a given depth is maintained with remarkable uniformity. Care is needed that the introduction of the air current shall be so directed and diffused that it will not blow upon the milk or cream, as the effect of such a blast of air upon pan-set milk is to make the cream dry and leathery.

With such a system of ventilation and a setting of the cream in broad vessels with much light, but never direct sunlight, and frequent stirring, the conditions are as complete as possible for rapid ripening and fine flavor of butter. The flavor desired must be determined by the length of time of ripening and the amount of stirring and aeration required. Mild milk-flavored butter is made from sweet cream without ripening.

HEAVY MILK.*

"In some of Mr. Fjord's experiments he met with milk which would partly refuse discharging the cream by intense cooling.

"It would generally appear every fall when most of the cows were old milkers.

* "Creaming Milk by Centrifugal Force," J. D. Frederiksen.

"Mr. Fjord called it 'heavy' milk, and made the phenomenon the object of thorough investigation. When the milk is heavy the cream will rise slowly, it will appear thin, and there will be no sharply marked line between the cream and the skim-milk, while the latter is less blue than usual. From such milk the cream can never be fully separated by cooling.

"Shallow tubs will do it better, yet not satisfactorily, and only the separator will do the work perfectly well. In the series of experiments previously mentioned the milk was heavy during October, November and December, when the ice system proved perfectly worthless, leaving as much as 2.75 per cent. of fat in the skim-milk, and giving a yield as low as 1.25 pounds of butter from one hundred pounds of milk—the same milk producing 4.27 per cent. of butter by the centrifugal creaming. By transportation and premature cooling, milk which is not originally heavy may become so, and many creameries have been troubled on account of that. The centrifuge removes the trouble."

In a paper by Major Henry E. Alvord occurs an account of the peculiar churning quality of milk as witnessed at Houghton Farm:

"It has long been our practice at Houghton Farm to make frequent churn tests of the milk of every cow in the herd, as well as of the mixed milk of the dairy. We had one cow, 'Clover,' good for sixteen or seventeen pounds of butter a week when at her best, and usually fresh in the spring. Two years ago she failed to calve in the spring, and became fresh on dry feed. Testing her at the usual time of calving, when she gave as much milk as formerly when fresh, I was surprised to get only twelve ounces of butter where I had expected to get thirty ounces. We at once examined her milk, and found it to be as rich in butter fat as ever. So I tried again, got twelve and a half ounces of butter from the first churning of thirty-seven pounds of milk, and then churned the same milk (buttermilk) a second time, and got twelve ounces more of butter. A third churning of the same milk gave five and one half ounces, and a fourth one and a quarter ounces—a total of thirty-one and a quarter ounces of butter from thirty-seven pounds of milk.

"Churning a fifth time, the milk failed to yield any butter."

CHURNING.

When the cream has reached the proper standard of ripening it is poured into the churn, filling to about one third its capacity, through a fine wire strainer, to give a soft and even texture. It must be accurately tested at 62° in summer and at 64° Fahr. in winter. The churn may be of the barrel pattern (Stoddard), working end over end. The power may be applied from the engine, by animal power, or any convenient apparatus, according to size of churn. As soon as the sound within indicates that the point of separation is reached, it is also shown by the glass indicator in the lid becoming clear; a small quantity of cold, weak brine, at about 55°,

is to be poured into the churn to facilitate granulation, when a few more revolutions cause the butter to form granules about the size of barley grains. The churn is then stopped and the buttermilk strained off and set aside. The time required for churning will vary from twenty to thirty minutes under a moderate speed of revolutions.

RINSING THE GRANULES.

The butter grains are then to be rinsed in cold, clear spring water, weak brine, or pure filtered water, at a temperature of 62°, using three or more washings until the water falling into the vessel beneath the churn runs clear, free from any tinge of buttermilk or caseous particles.

CLEANING AND WORKING BUTTER BY CENTRIFUGE.

"A new method of washing butter has been patented in Germany. As soon as gathered in the churn, in particles of about one tenth of an inch in size, it is transferred to a centrifugal machine, whose drum is pierced with holes, and lined with a linen sack that is finally taken out with the butter. As soon as the machine is set in rapid motion the buttermilk begins to escape: a spray of water thrown into the revolving drum washes out all the foreign matters adhering to the butter. This washing is kept up till the wash-water comes away clean, and the revolution is then continued till the last drop of water is removed, as clothes are dried in the centrifugal wringer. The dry butter is then taken out, moulded and packed. It is claimed that the product thus so fully and quickly freed from all impurities, without any working or kneading, has a finer flavor, aroma and grain, and far better keeping qualities than when prepared for market in the ordinary way."

SALTING.

Salting is one of the most important essentials to successful dairying. Its purposes are threefold—to increase the density and dryness; to augment the flavor by contrast and increase of piquancy; and to give antiseptic qualities that will prevent fermentation and rancidity. In regard to the properties of dairy salt, I quote from the Annual Report of the Connecticut Agricultural Experiment Station for 1882: "The putrefaction, or spoiling of meat, and probably also the rancidity of butter, are caused by microscopic organisms, probably vegetable in their nature, which are latterly known in science as *bacteria*. If the growth or multiplication of these organisms is hindered or prevented, putrefaction and rancidity are correspondingly checked or altogether stopped.

"In the preservation of food, salt is most applicable, because it is the cheapest and least injurious to the health of man, small quantities being beneficial to health and agreeable to taste."

From a partial analysis given, the composition of Higgin and Ashton salts is calculated as follows:

	Higgin.	Ashton.
Water at 100°	0.48	0.71
Sulphate of Lime	1.41	1.40
Chloride of Calcium	0.08	0.14
Chloride of Magnesium	0.26	0.21
CHLORIDE OF SODIUM—SALT	97.77	97.54

"The sulphate of lime is tasteless; the chlorides of calcium and magnesium are highly soluble, with a bitter taste, and greedily attract moisture from the air, but a few thousandths of one per cent. have no appreciable effect on the taste or on the articles it is used to preserve. Salt generally used rarely contains less and often more impurities, and these are not recognizable by the taste.

"Salt may be too fine or too coarse for salting butter. Fresh-churned butter contains a quantity of the milk-serum or buttermilk, which it is one object of salting to remove. When salt is worked into butter each grain of salt gradually dissolves in the buttermilk and withdraws it from the butter, probably shrinking the bulky, jelly-like casein, just as salt mixed with a jelly of soap shrinks the soap into a small, firm cake, and unites with the water to make a brine. If the salt be very fine the result is to fill the mass of butter with a multitude of very small drops of brine, which are difficult to work out of the butter. On the other hand, if the salt be very coarse the buttermilk will gather in large drops, easy to work out, but the salt grains will not be entirely dissolved, and will make the butter too salt and gritty to the taste. The proper fineness, therefore, is that which comes just short of occasioning the last-named difficulty, so that by its use we remove the buttermilk thoroughly, without leaving any unpleasant surplus of salt in the butter.

"The Ashton butter-salt and the Syracuse factory-filled dairy salt are commonly reputed to have the degree of fineness suitable for dairy use. According to Alexander Müller, the grains of a good dairy salt should have dimensions lying, for the most part, between one twenty-fifth and one fiftieth of an inch in diameter (one half and one millimetre).

"The mechanical analysis of these two salts is as follows:

	Higgin, fine.	Ashton, coarse.
Between 2 and 1.5 millimetres	0.0	4.4
Between 1.5 and 1.0 millimetres	1.0	10.9
Between 1.0 and 0.5 millimetres	13.0	20.8
Less than 0.5 millimetres	86.0	63.9
	100.00	100.00

"While a moderately coarse salt may answer best for the first object of salting, viz., to withdraw the buttermilk, a finer grade may be better suited to the other object, the preservation and seasoning of the butter.

"Good salt for dairy use should dissolve in water, making a clear or very nearly clear brine. The coarse Turk's Island salt is often very dirty, and makes a brine that might be said to look like soap-suds."

MIXING SALT IN BUTTER.

If the churning is properly done, bringing the butter to the barley-grain form and getting all the butter from the cream, which may be better effected by mixing a quantity of water or thin sweet milk with the cream when it goes into the churn, and regulating the temperature to 64°, and thoroughly rinsing the butter granules so as to remove every trace of buttermilk, using first clear water, then weak brine, the process of salting is best done by mixing thoroughly the finer salt at the rate of one half ounce—some may prefer one ounce—of salt to the pound of butter. The salt can very easily be incorporated with the butter. Spread and press the butter upon the *mixer*, pressing or rolling it into a thin sheet, about a half inch in thickness, and sprinkle the salt from a sifter evenly over the surface. Fold the sheet of butter double and press or roll it out thin again. Repeat this three or more times, and the salting is completed.

All the salt applied will remain, and the butter will require no more mixing; many prefer a lever worker to the roller.

"Working," as the term is usually applied, is an injury to butter. Unless the salting is evenly done it is one of the causes of streaks in butter.

MOULDS OR PRINTS.

After the butter has been salted it is best to put it in the form in which it is to be marketed with as little delay as possible. The temperature of the butter-room should be kept at 62°, and the butter moulded without allowing the hand of the operator to touch a particle of it. This rule ought to be strictly enforced.

There need be no second mixing or "working," and the butter should be handled with wooden scoops and spatules without bruising or spatting, but simply laid in the moulds and pressed into the desired form and size. These may be square, and half-pound, pound, three, and five-pound prints, to suit the wishes of patrons, the larger sizes being more economically marketed, but many customers preferring the half-pound prints.

The use of a monogram and decoration to designate the dairy is desirable. Each print should be wrapped in moist, snowy muslin, and placed in a clean, square wooden box, and these packed in a cooler at such temperature as desired, 62° being

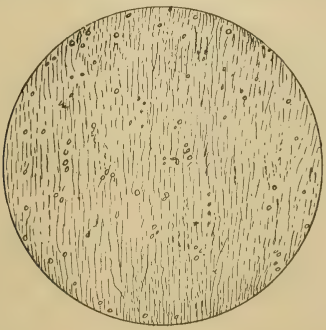
well suited to good keeping. Freezing and thawing speedily destroys the quality of butter.

SUGAR IN BUTTER.

Sugar is sometimes mixed with salt to give a desired flavor to butter, and is very agreeable to many palates. When the butter is thoroughly rinsed in granular form, the sugar may be triturated (using the pure white finely pulverized) in a mortar with the salt for a half hour, one part sugar to three parts of salt, and thoroughly incorporating the mixture in the butter. A difference of taste is allowable for the quantity of salt in butter, whether with or without sugar. The quantity varies from one fourth or one half ounce to one ounce in the pound. One half or three fourths of an ounce of salt and one fourth ounce of sugar to the pound give a good flavor if thoroughly mixed and incorporated.

INCORPORATION OF SALT.

Mr. Henry Stewart commends the above practice of using fine sugar in an article published in the *Country Gentleman*, November, 1884. The same article also illustrates the effects of good and bad salting in two specimens of butter. The salt and sugar need to be perfectly dissolved in the butter, and in order to do this it must be pulverized very finely and passed through a fine sieve to remove scales. It is hardly practicable to do the triturating except when the material is to be used,



SAMPLE I.
SALT DISSOLVED IN BUTTER.
After H. Stewart.

SAMPLE II.
SALT UNDISSOLVED IN BUTTER.
After H. Stewart.

because of deliquescence. I reproduce here the microscopic slides as given by Mr. Stewart, showing the texture of well-salted butter in No. 1 and badly salted butter in No. 2.

"In sample No. 1 not a single salt crystal was found. The texture is seen to be much closer and the dryness is conspicuous. The very small globules of brine are few in number, and the moisture is diffused invisibly through the mass, so that every particle is enveloped in a film of brine, which is an antiseptic fluid, and preserves the butter from all contact with air. This is the true preserving effect of the salt in the butter. In regard to the flavor of perfectly salted butter, it is evident that the saline taste is so evenly diffused that it is quite subordinate to the flavor of the butter, and that consequently the real butter flavor is paramount, and is really aided by the piquancy of the salt.

"In sample No. 2 the texture is more open, from the greater quantity of moisture contained in it. The large drops of water, some of which had not reached the salt, and some were already saturated, and could dissolve no more, gave an excess of softness and a want of firmness to the butter; while the undissolved crystals of salt quite overpowered the flavor of the butter, leaving, however, some of the butter not influenced at all by the salt. This evidently must injure the butter in both texture and flavor, because there is too much salt in part and not enough in part. All this shows that a microscope may be made a valuable aid in dairy work."

BUTTER FLAVOR.

Butter is chiefly composed of a solid crystallizable fat, a fluid oily substance consisting of a mixture containing *olein* and a fragrant fatty principle *butyrin*, a yellow coloring matter, and a small quantity of the casein of milk. Chemists make a still further analysis of butter, giving no less than nine fatty acids, combined with glycerine—four of the acids solid and five fluid. The solid are stearine, palmitine, myristine and butine, chiefly of the two former.

The fluid fats are olein, butyrin, caproin, caprylin and caprinin. About one third of the fat is olein, but the relative proportions of hard and soft fats in butter are very variable, running as high as sixty per cent. of fluid fats when cows are fed upon green succulent food. Various etheric oils of both vegetable and animal origin, together with the coloring matter and numerous unknown elements, combine to give flavor and aroma to butter. Any substance capable of being taken up by the circulation, whether wholesome or poisonous, pleasantly fragrant or offensive, may appear in the milk and cream, and consequently affect more or less the flavor of the butter, which therefore varies according to the varying conditions of breed and feed, as well as many other circumstances. The method of making, whether centrifuge, whole-milk, pan or deep-can system, has much to do with flavor. The quality of making, the cleanliness, the kind of vessel in which cream is ripened, the surroundings, the atmosphere, the weather, the quality and fineness of the salt, the thoroughness of incorporation, and the quantity used—all affect the quality and flavor of the butter.

The temperature at which each operation is conducted and at which the butter is subsequently kept has much to do with quality and preservation of original flavor.

The flavor of butter is also greatly affected by the manner of the keeping of the cream as to its thorough ripening. Cream that is not sufficiently aerated will make an insipid quality of butter. The souring of cream will not give flavor, but thorough aeration and abundant north-light will give a higher flavor and better color to the butter. When ripe the cream has a pleasant acid taste, and will then make a good-flavored butter.

Butter, like milk and cream, has remarkable absorptive qualities, and is liable to contamination and injury from any odor, even during the process of manufacture. Delicate odors, like the strawberry and peach, will spoil the flavor of butter by inciting fermentation. The flavor of the metal or wooden vessel in which cream is ripened may be communicated to butter. The flavor of tin, however clean, is very offensive and nauseating when communicated to drinking-water at any temperature. Tin is not the best material in which to ripen cream; zinc and galvanized ware form dangerous poisons; glass or delf insures a cleaner flavor to butter and to cheese, with safety from poisoning by lactates of zinc and tin.

FEEDING FOR FLAVOR.

The flavor of the milk, cream, cheese and butter is widely variable, according to the aromatic qualities and richness of the ration. Marsh grasses, bog hay, and buckwheat bran will give very little butter, and that flavorless. Cotton-seed meal, though rich in fat, gives a bad-flavored butter, and linseed meal and oil-cake are but little better. To have rich flavor in butter, the food must contain certain aromatic oils and flavors that, passing through the alembic of the cow's udder, shall retain their delicacy embodied in the cream globules.

A rich aroma and high flavor pertain to butter where cows have wild highland pasture of sweet grasses uncontaminated with any coarse or bitter weeds. If to butter made from such sweet juices is added the sugar and salt as previously directed, you have the very acme of flavoring in butter, especially in June, or later in the season, if the grasses are not allowed to get hard and seedy. All grasses give the richest juice for flavor when in the tenderest growth and abounding in succulency. All the soiling crops, with the exception of sweet corn, are best in their very young growth.

Rye, when of rank growth and near to ripeness, will often give a very unpalatable flavor to milk and butter. So may wheat, barley, oats, maize and clover, when too mature and fed excessively, especially if given singly. A mixture of two or more of these, not too mature, is better for flavoring. Sweet corn, with ears in the milk, is good butter fodder. Professor Brewer speaks of Alfilaria, a species of geranium, as being grown for forage in California, where it is considered highly aromatic for making fine-flavored butter. Fermented foods, including ensilage, cannot possibly produce the finest flavors. In winter feeding, *maize meal*, when combined with wheat shorts and oatmeal, gives a rich, nutty flavor to the butter, provided the meal is always of good quality.

If there is the slightest degree of fermentation, the result of feeding will be a very marked deterioration in the quality and a falling off in the quantity of butter. Hay made from quickly cured green oats, just in the milk, or grass cut before flowering, or clover cut early, and well-cured stover of sweet corn, with maize meal and a small quantity of carrots, make a fine combination for winter flavoring. When apples are very abundant, and do not find a ready market, they make a choice addition to the ration, especially if of a rich and spicy quality. Special care must be had in feeding them, to begin moderately and gradually increase the quantity. Two quarts at first and afterward a half bushel may be given daily. These should always be passed through the root-cutter and mixed with meal and bran. Feeding them whole endangers choking the cow. The feed of butter cows can never be too good in quality, and without the best quality it is impossible to have good butter.

EFFECTS OF SEWAGE GRASS AND SEWER GAS UPON MILK AND BUTTER.

"Dr. Smee, F.R.S., in the (Dublin) *Farmer's Gazette* states that he has found, by a comparison of the milk from cows fed on ordinary meadow grass and on grass from a sewage farm, that in the latter case the milk went putrid before twenty-six hours, and the butter became rancid very rapidly, compared with that made from the milk of cows fed on ordinary meadow grass. These effects were more apparent in the spring than in the latter part of the summer. On three or four occasions he also noticed that when the milk of cows fed on sewage grass was placed on a dializer the casein passed through the membrane, from which it would appear that the casein existed in these milkers in a modified form. Milk which had been exposed to sewer gas from an untrapped drain, although, on analysis, it appeared to be unaltered in composition, yet when distilled at a low temperature (100° Fahr.) it yielded a distillate that had a very offensive smell. It also caused intense headache, which was followed by diarrhœa. The milk of cows suffering from foot-and-mouth disease has been examined and found bad. Dr. Smee expresses his opinion that the methods employed by public analysis are not sufficiently delicate to detect the slight physiological change which may take place in a fluid so complex as milk."

KEEPING QUALITY OF JERSEY BUTTER.

Jersey butter, when made according to modern scientific methods, has the best keeping quality. As the casein is the chief element of destructive fermentation in milk, it becomes necessary, in the manufacture of butter, to remove this element as completely as practicable, and consequently the best made and best keeping quality of Jersey butter is that which has the smallest portion of casein. It is true that butter, however well made, is a quickly perishable commodity, and under ordinary circumstances rapidly degenerates, having in itself many of the elements that facilitate decomposition.

Butter is best on the day of its manufacture, and is subject to many accidents that hasten its destruction. It is very absorptive, and is quickly contaminated with any impurity or any foreign odor. If it is frozen the decomposition becomes rapid in any temperature above 40°. Freezing is ruinous to butter. Artificial coloring introduces elements that excite decomposition and destroy the quality and flavor. The sooner it is eaten, when rightly made, the better for both maker and consumer. The experiment has been tried of preserving butter in the granular form, by submerging it in vessels filled with clear, strong brine, and reported as a success. Jersey butter should be kept as near a temperature of 62° as practicable. In transportation it must be well guarded against changes of temperature, and in the consumer's care be wholly excluded from the air until used. Jersey butter bears

transportation well, and reaches the consumer in better condition than it is possible for that of any other make under the same conditions of weather.

CHEMICAL ANALYSIS OF BUTTER.

Samples analyzed for Dr. Sturtevant, November, 1876, by Mr. Sharples: Nos. 1 and 6 from the dairy of Mr. Edward Burnett, Southborough, Mass.:

Class.	Retail Price per Pound.	Water. Per cent.	Fat. Per cent.	Casein. Per cent.	Ash. Per cent.
1. Jersey............	$0.90	11.15	86.01	1.77	1.07
2. Jersey............	0.80	9.44	87.78	2.02	0.76
3. Jersey............	0.75	9.94	85.89	2.68	1.49
4. Grade Jersey......	0.40	9.52	86.95	1.65	1.88
5. Poor Tub.........	0.25	9.88	87.14	1.90	1.08
6. Centrifuge, 1880...	....	14.27	84.53	1.11	0.09

The following is the Houghton Farm report on butter contributed for this work by Mr. Alvord; analysis made by Professor H. W. Smith, chemist:

Elements.	Jerseys. Houghton Farm, Mountainville, Orange County, N. Y.	Ayrshires. Smith Farm, Tompkins County, N. Y.	Holsteins. Meadowbrook Farm, Orange County, N. Y.
Water....	7.8	9.1	12.1
Fat..........................	87.30	86.75	82.60
Casein	1.3	1.4	2.6
Salt and Ash..................	3.9	2.8	4.0
Volatile Fat-Acids.............	9.88	10.85	8.84
Non-Volatile Fat-Acids.........	77.42	75.90	73.76

Correct.

HOUGHTON FARM, October, 1884. HENRY E. ALVORD, *Manager.*

The variations in the composition of genuine well-worked unsalted butter are, according to Fleischmann:

Water, from 8 to 18; average, 14 per cent.

Fat, from 80 to 90; average, 84 per cent.

Other solids, from 0.8 to 2.4; average, 1.5 per cent.

ENGLISH BUTTER.*

Elements.	In 100 Parts.	In 1 Pound.	
		Ounces.	Grains.
Water	10.0	1	262
Casein	1.0	..	70
Milk Fat	87.7	14	14
Milk Sugar	0.3	..	21
Common Salt	1.0	..	70

A. H. Church, M.A.,
Professor of Chemistry, Royal Academy.

SALT BUTTERS—FORTY-EIGHT SAMPLES.

Water, from 8.48 to 28.60 per cent.

FRESH BUTTERS.

Water	4.18 to 15.43 per cent.
Salt	0.30 to 2.91 "
Fat	67.72 to 96.93 "
Water and Salt even	20, 30 to 35. "
Curd	1.18 to 5.13 "

Arthur Hill Hassall, M.D., London.

Curd .... 1.61 to 7.83 per cent.

SALTED BUTTERS.

Elements.	Jersey.	Hassall.	Ventner.	Butterine.
Water	10.44	6.50	3.88	5.83
Fat	78.49	85.38	86.28	92.77
Curd	2.53	2.84	3.28	0.53
Salt	8.32	5.28	6.60	0.83

Angell & Hehner.

* From Jersey Bulletin, 1884.

ADULTERATED BUTTERS.—DEVON.

	Blythe's Analysis.		Angell & Hehner's Analysis.	
Water	17.10	13.36	23.98	42.35
Fat	78.50	76.34	67.58	47.01
Casein	1.72	6.64	6.88	7.85
Salt	2.68	3.70	1.55	2.68

GENUINE BUTTERS.

Elements.	Normandy (Fresh).	Isle of Wight.	Guilford.	Winchester.
Water	9.30	12.98	9.10	8.58
Fat	82.64	83.87	84.74	85.48
Curd	5.13	2.72	3.47	2.78
Salt (Ash)	2.19	0.40	2.08	3.15
Milk Sugar	....	....	....	....

Angell & Hehner.

König: Average of eighty-nine analyses:

Water	14.14
Fat	83.11
Curd	0.86
Salt (Ash)	1.19
Milk Sugar	0.74

[For numerous analyses of Jersey butter, see Tables of Official Butter Tests.]

BAD FLAVORS IN BUTTER.

It is not necessary to resort to oleomargarine and butterine for disgusting odors and flavors. The fetor and flavor of the filthiest slaughter-houses are obtainable in those productions of a fraudulent art; but all badly made butters have a multitude of defects. The best Jersey cows, the best buildings, best feeding and keeping, best utensils, best facilities, and best advantages of every kind will not insure good butter. The article that is botched in the making always tells its own story. Such butter is sloppy and slushy, full of water, gritty with undissolved salt, sour with buttermilk and curd, bitter from bad salting and uncleanliness, and in a very short time this badly made butter will so offend the sense of smell that you will be glad to cast it into the manure vat, where it belongs.

Rancidity quickly follows the botching of butter, and you have *butyric acid*, which gives a pungent, rancid odor and sour taste; *caproic acid*, with an odor which

is rather slight, but resembling that of vinegar; *caprylic acid*, which exhales the powerful and disgusting smell of a he-goat or fetid armpit sweat; and *capric acid*, that has a mixed odor of he-goat and vinegar, also *valeric acid*, another indescribable stench.

Oleomargarine gives all of these odors and flavors, with the peculiar *slaughter-house perfume* of decomposing tallow *thrown in gratis.*

Butter made from cotton-seed meal has a bad flavor. The flavor of ensilage is not the best that may be had, neither that of turnips, cabbage or ragweed. Many a stray plant growing in the pastures gives an offensive taste to both milk and butter. Wheat shorts and poor hay give a butter that is almost flavorless, while buckwheat bran deprives the milk of both butter and flavor. The meadows and pastures must have thorough inspection and be kept at a high standard of purity in regard to the quality of plant growth for cow-feed.

The flavor of the best butter is transitory, "fleeting as a summer cloud." "Give it neither time nor associates, for there is always danger from the moment it leaves the cow's udder until it passes down the throat of the consumer."

The flavor of cabbage may be in great part avoided if the feeding is made immediately after milking. Turnips, beets and parsnips should be fed in the same way, taking care to remove the tap-root of turnips, as being rank-flavored, and there is then little probability of the flavor appearing in the milk or cream, but it is best to feed only *carrots* and *parsnips* to milch cows. If the flavor should appear in ever so slight a degree it may be overcome by the use of a small quantity of nitrate of potash (saltpetre) put into the churn with the cream. Use a half teaspoonful of saltpetre dissolved in a teacup of water for four gallons of cream.

CHEMICAL TEST FOR BUTTER.

"Thomas Taylor, M.D., microscopist of the Department of Agriculture, gives the following test for butter: 'If a few drops of sulphuric acid be combined with a small quantity of pure butter, the butter will assume first an opaque whitish yellow color, and after the lapse of about ten minutes it will change to a brick red.

"Oleomargarine made of beef tallow, when treated in the same manner, changes at first to a clear amber, and after a lapse of about twenty minutes to a deep crimson.'"

HERD YIELDS OF BUTTER.

Col. Waring gave as a yearly average (1872) for a herd of nineteen Jersey cows, two hundred and twelve pounds each of butter. Mr. Roberts reports the butter yield of Mr. Allen's herd at Pittsfield, Mass., at an average of two hundred and thirty-nine pounds in 1875, two hundred and forty-five pounds in 1876, and in 1877 two hundred and seventy-eight pounds.

In 1874 Mr. Mackie's herd of fifteen cows gave an average of two hundred and eighty-one pounds.

Mr. Moses Y. Tilden's herd in Lebanon, N. Y., produced in 1873 an average of three hundred and thirty-three pounds.

The herd of Mr. Thomas J. Hand, at Sing Sing, N. Y., produced in 1874 an average of four hundred and six pounds of butter.

HOUGHTON FARM JERSEY HERD 1883.

Henry E. Alvord, Manager.

"Special test churnings were made periodically to get the ratio of butter to milk, in the product of the herd. The average of these records for the year is six pounds seven and a half ounces of merchantable butter for every one hundred pounds of milk, or one pound of butter for every fifteen and a half pounds of milk. Applying the average ratio for the year, we find the average butter product to be for ten selected cows, three hundred and ninety-eight pounds, ten ounces, per year; for the herd of fifteen animals, including the two aged cows and three heifers, three hundred and seventy-seven pounds a year."

Jersey Herd yield of "Mapleton Farm," A. Baker, West Dryden, New York, for four months, beginning April 1st, 1884. Twelve cows, including one, two years old; two, three years; four, four years; one, five years; two, six years; one, eight, and one, ten years old. Nine were giving milk at beginning of test. Of the others, one calved May 18th, another May 22d, and the third, June 8th. The nine had been in milk two and a half months average.

9	Cows,	April	Butter,	269¾	pounds.
10	"	May (11 cows from May 22d)	"	389½	"
12	"	June (12 cows from June 8th)	"	508¾	"
11	"	July	"	460½	"

JERSEY HERD OF C. B. STRAIT, SYLVANIA, PA.

Six cows—two, three years old; two, four years old, and two past ten years—test on grass alone, from June 14th to June 20th, 1884, seven days. The total amount of butter made when salted and ready for market was ninety-eight and a half pounds, an average of sixteen pounds six and a half ounces per cow. Four of the cows were sired by Aberdeen of Clermont 2531. Only one of the six is registered, but all are thoroughbred. The registered cow made seventeen pounds and ten ounces of butter in seven days.

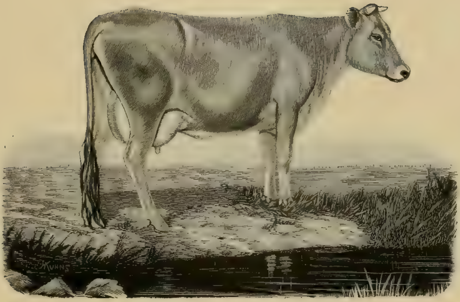
FADETTE OF VERNA 3d 11,122.

AT 3 YEARS OLD.

Signal Type.

ELLASLEIGH HERD.

G. W. FARLEE, TRENTON, NEW JERSEY.



HARMONY 2d 17,118.

AT 5 YEARS OLD.

Signal Type.

BELMONT HERD.

RICHARD PETERS, ATLANTA, GEORGIA.

THE THERMOMETER IN THE DAIRY.

Any one who is at all familiar with first-class dairy work knows that in the making of delicious butter and superior cheese, it is absolutely necessary to keep everything at the right degree of temperature in every stage of every process.

In order to do this, thermometers are required that are very nearly correct. The best thermometers are imperfect, because of the impossibility of making a vacuum chamber of uniform calibre throughout in such a substance as glass. No cheap thermometer can be trusted in the dairy, as such an instrument may vary two to five degrees from the standard, and while it may agree with the standard at one point, will be far away at another. Every butter and cheese maker should have one tested and officially certified thermometer from which he can gauge the less expensive ones by marking upon them all variations from the standard.

FEEDING FOR BUTTER.

The series of tests made at the New York Experiment Station and published in the report for 1883 are very instructive.

DAILY AVERAGE FOR EACH WHOLE PERIOD.

DATE.	Milk.	Fat.	Butter.	Actual Fat.	Butter.
1883.	Lbs.	Per cent.	Per cent.	Oz.	Oz.
First Period, Jan. 2d–7th........	55.14	5.19	4.91	45.58	43.46
Second " " 8th–14th	53.35	5.66	5.50	48.38	46.94
Third " " 15th–19th......	61.84	4.87	3.72	49.25	36.70
Fourth " " 20th–25th......	58.33	4.76	3.97	44.36	36.83
Fifth " " 26th to Feb. 3d.	50.	5.14	4.18	41.07	33.50
Sixth " Feb. 4th–11th......	37.63	4.99	4.74	30.17	29.56
Seventh " " 12th–18th.....	42.37	4.93	4.73	33.46	32.13

The above table gives the product of four Jersey cows whose average normal weight was seven hundred and nine pounds each.

During the First Period, six days, they were fed twenty pounds of hay, four pounds of corn meal, four pounds of shorts, to each cow.

The Second Period, seven days; three days, twenty pounds of hay and twelve pounds of shorts; two days, fifteen pounds of hay, ten and a half pounds of shorts; and two days, fifteen pounds of hay and twelve pounds of shorts.

The Third Period, five days, fifteen pounds of hay, twelve pounds of gluten meal.

The Fourth Period, six days, fifteen pounds of hay, ten pounds of corn meal.

The Fifth Period, nine days, three of which they had five pounds of hay, four pounds of corn meal, four pounds of shorts, ten pounds of ensilage; the second three days, five pounds of hay, four pounds of corn meal, twenty pounds of ensilage; the third three days, four pounds of corn meal, thirty pounds of ensilage.

The Sixth Period, eight days, from one hundred and sixty pounds to two hundred and fifty-five pounds of ensilage.

The Seventh Period, fifteen pounds of hay, four pounds of corn meal, four pounds of shorts.

In studying the above table some allowance must be made for the influence of food extending from two to four days or longer into each subsequent period. There is an increase in quantity of milk under gluten meal and corn meal, and a great falling off under ensilage.

"The hay and gluten feeding, Third Period, shows a great waste in butter and other solids; next to that, in Fifth Period, when the ration was insufficient, a large waste; Fourth Period, hay and meal feeding, also shows waste to a large extent; Second Period, hay and bran feeding, far less waste; Sixth Period, ensilage feeding, still less waste; and First, Fourth and Seventh Period, hay, bran and meal feeding, scarcely any waste of butter. We can see that when meal is added to the ration, First, Fourth and Seventh Period, the waste averaged 2.16 ounces; where bran was added to the ration, First, Second and Seventh Period, the waste averaged but 1.22 ounces. In the case of hay and meal, Fourth Period, 4.97 ounces; in the case of hay and bran, Second Period, 2.17 ounces. We must thus believe that the adding of bran to the meal feeding was advantageous to butter recovery from the milk, and that bran is more economical for butter recovery than meal." "The whole table gives evidence as to the value of wheat bran as a butter fat yielding food for cows." "The butter which may be obtained from the milk seems more dependent upon the character of than upon the composition of the food."

The food must not only have all the elements in suitable proportions, in order to produce the best milk, but that food must have a certain quality which shall fit it for bovine digestion and assimilation. The lacteal organs have the power of selecting and secreting the elements from certain foods of peculiar quality, and those alone are profitable in the dairy.

FOOD AND QUALITY OF MILK.*

"As there is a very close analogy, if not an actual connection or alternation, between the fat of the tissues of a cow and the fat of the milk, it certainly would seem that as the quality of the food has a great deal to do with increasing the quantity of fat

* Henry Stewart, in *Country Gentleman*, 1884.

deposited in the tissues, so it must have a good deal to do with increasing the quantity of fat deposited in the milk glands and conveyed from them into the milk. I have a record of a pure Jersey from the first week's churning, when at twenty and one half months old, she produced eight and one half pounds of butter. The standard feed of all my cows has always been, for morning and night's feeding, five pounds of cut hay or corn fodder wetted and mixed with five pounds of meal made of three hundred pounds of corn and two hundred pounds of fine wheat or rye bran, preferably the latter, ground together as fine as possible; and five pounds of long hay at noon; any extra meal is given dry at this time. As a normal food, I have found none better, more easily and cheaply procured, and more safe and satisfactory in all respects. But I have at times varied this standard ration with every kind of feed that has been on the market, and have carefully noted the results. Some of these for this particular cow I will give. The feeding was the same as the standard above given from January 4th, 1880, when the calf was a week old, and the milk was set for cream.

"In January the butter yield was 1.34 pounds per day; February, 1.25, and March, 1.145. On April 1st the feed was changed to six pounds of wheat middlings, with the hay as usual, twice a day. The butter yield for April and May in this feeding was 0.95 and 0.84 pounds per day, the butter being very white and crumbly.

"In June and July the ration was changed to two pounds of wheat bran (fine bran, with considerable middlings, sometimes called 'sharps') and three pounds of palm-nut meal. The butter yield was 1.29 and 1.18 pounds respectively. In August the food was changed to two pounds of the bran with two pounds of fine bolted corn meal and two pounds of cotton-seed meal. The yield for August was 1.22 pounds daily; September, 1.45, and October, 1.28. The milk now began to fall off in quantity. Through 1881 the same difference in regard to cotton-seed meal was shown, and the butter yield came up to 1.83 pounds a day. I was expecting to get up to two pounds a day, when the cow had an attack of garget, and did not fully recover until October, when on two pounds of the bran and three pounds of fine yellow meal she gave 1.66 pounds of butter daily. The next season I kept a more particular account, and weighed the milk carefully. This season lasted from May 9th, 1882, to December 6th, 1883.

"The very large difference caused by buckwheat bran—the cow fell off in flesh very much in those two months, and took two months more to fill up again—is almost exactly paralleled by glucose meal, which increased the milk of some other cows, but considerably reduced the quantity of butter; and also, but not to so great an extent, by the new process linseed meal and by brewers' grains; all of these make more milk but less cream. I must say I have little confidence in the conclusions of the German scientific people, and in the mass of food tables and various rations they give,

and still less in this idea, that the quality of the food has no effect upon the quantity of the butter, and should be very glad to have it shown that they are mistaken."

RECORD.

Food Used.	Date.	Pounds of Milk.	Pounds of Butter.	Pounds of Milk to 1 Pound of Butter.
2 lbs. Bran .... 3 lbs. Corn Meal....... 1 lb. Cotton-seed Meal..	May 14th to 30th..	592	32	18.5
	June	926	51	18.0
	July	918	$53\frac{1}{2}$	17.1
	August	930	61	15.2
5 lbs. Mixed Meal..... $\frac{2}{5}$ Bran .... $\frac{3}{5}$ Corn...............	September........	902	$48\frac{3}{4}$	18.5
	October..........	840	$40\frac{1}{4}$	21.0
	November	897	42	21.1
	December........	912	$40\frac{1}{4}$	20.25
	1883.			
5 lbs. Buckwheat Middlings and Bran	January	1,009	24	42.0
	February.........	912	22	41.5
5 lbs. of the Standard Meal............... $\frac{2}{5}$ Bran............... $\frac{3}{5}$ Corn...............	March............	690	23	30.0
	April............	793	$38\frac{1}{4}$	20.6
	May.............	807	41	19.7
	June.............	671	34	19.7
	July	464	$26\frac{1}{4}$	18.0
	August	482	28	17.2
	September	430	24	18.0
	October..........	281	$20\frac{1}{2}$	13.7
	November........	241	22	11.0
	December (6 days).	38	3	12.7

FEED AND BREED OF DAIRY COWS.

The following summary of conclusions by Dr. E. L. Sturtevant are the result of many years of study and experiment:

"1. The production of butter is largely dependent on breed.

"2. There is a structural limit to the production of butter to each cow.

"3. When a cow is fed to this limit, increase of food cannot increase the product.

"4. That the superior cow has this structural limit at a greater distance from ordinary food, and is more ready to respond to stimuli than the inferior cow.

"5. That consequently the superior cow is seldom fed to her limit, and as a practical conclusion, increased feed with a superior lot of cows will increase the butter product, but if fed to an inferior lot of cows, waste can but be the result.

"6. That the character of the food has some influence on the character of the butter, but even the breed influences more than the food.

"7. There is no constant relation between the butter product and the cheese product.

"8. That the casein contains a constant percentage, and that this percentage does not appear to respond to increase of food.

"9. That the casein appears to remain constant without regard to the season.

"10. That increase in the quantity of milk is followed by an increase in the total amount of casein.

"11. That *insufficient feed acts directly to check proportion of butter and has a tendency to decrease the casein of the milk and substitute albumen.*

"12. The best practice of feeding is to regulate the character of the food by the character of the animal fed; *feeding superior cows nearer to the limit of their production than inferior cows;* feeding, if for butter, more concentrated and nutritious foods than for cheese; feeding for cheese product, succulent material which will increase the quantity of the milk yield."

CONTRAST OF BREEDS.

A Jersey cow weighing 800 to 1000 pounds will give 35 to 50 pounds of butter to 100 pounds of live weight, or 700 to 800 pounds of milk to 100 pounds of live weight; while a Dutch (Holstein) cow weighing 1300 to 1700 pounds will give 20 to 26 pounds of butter to 100 pounds live weight, and 675 pounds of milk to 100 pounds of live weight.

One pound of Jersey milk is equivalent in value to two and one half pounds of Dutch or Holstein-Friesian milk.

BUTTER IN DIFFERENT BEEEDS.

The butter production of the Jersey race is very exceptional, exceeding in that respect all other breeds of cattle. It is interesting to compare the Jersey production with that obtained from other known milking races. The following figures are established by the works of eminent agriculturists:

COMPARATIVE TABLE OF BREEDS.*

Race.	Milk per Kilogramme of Butter.†	Milk per Year.
Jersey	16 to 18 Litres.‡	3,000 to 4,000 Litres.
Cotentine	25 to 28 "	3,000 to 3,500 "
Breton	25 to 30 "	1,400 to 1,600 "
Schwitz	26 to 30 "	3,000 to 3,200 "
Ayr	28 to 35 "	2,500 to 4,000 "
Maine	28 to 40 "	2,000 to 2,500 "
Flemish	30 to 40 "	3,000 to 3,500 "
Holland	35 to 40 "	3,000 to 4,000 "

CRYSTAL SPRING FARM JERSEYS.

Mr. J. H. Walker, of Worcester, Mass., says: " I find my 'Victor Cows' average 13.57 lbs. of milk to a pound of butter, when fed two quarts of corn meal and two quarts of shorts per day. My whole herd average a pound of butter to 14.82 pounds of milk. The least milk to a pound of butter was from Pavon 12,485, who made 14 pounds 8 ounces of butter in seven days at twenty-five months old, from 134 pounds 8 ounces of milk, or 9.28 pounds of milk to a pound of butter."

BREEDS IN AMERICA.

The American Jerseys, compared with other breeds, show a better record than that given in the above table. Hundreds of our tested Jersey cows show as follows:

Race.	Pounds of Milk to 1 pound of Butter.	
Jersey	5 to 18.	Average 14
Guernsey	10 to 24.	" 19
Angler	14 to 26.	" 22
Red Poll	15 to 28.	" 25
Devon	18 to 30.	" 26
American Red (Native)	18 to 30.	" 26
Ayrshire	20 to 35.	" 28
Shorthorn	22 to 38.	" 29
Dutch or Holstein-Friesian	28 to 50.	" 35

It can readily be seen that a great disadvantage accrues to all who select the breeds that produce a secretion abounding in water; for it follows without argument that the most expensive method of securing a supply of water is by the laborious operation called milking.

* Jersey Cattle. By Henri Johanet. Translated by W. E. Simonds.

† A kilogramme is equivalent to $2\frac{1}{5}$ lbs.

‡ A litre is equivalent to 1.0567 qts. or $1\frac{1}{18}$ qts.

The increased labor in the dairy, the larger space required, the increase of utensils, all add to the expense without any recompense.

The milk of Jersey cows should sell in the market for its proportional value according to chemical analysis.

CONSTRUCTION OF ICE-HOUSES.

One writer announces that "ice in the dairy must go!" It will go when the dairy interest finds it expedient that it should go. Ice has its uses in all well-regulated dairies. It was never designed to be used as a destructive agent, as by the freezing of cream and milk, butter and cheese, but it has its place. The discerning dairyman will always appropriate ice to its place and service.

The ice-house must be as large as necessary to meet your purposes, for ice keeps best in a large house and in large bulk. Allow about thirty-four cubic feet for a ton. Dig the cellar below frost, lay drain pipe at the base of the foundation walls, with a free outlet, which must also be safe from frost. Build the walls of concrete, according to directions for barns, either octagon or square; fill the cellar with gravel and small stones for a sure drainage base. A single wall will suffice.

In filling the house, build up the blocks so as to have a layer of sawdust one foot thick beneath and around, and also fill all the interstices with the same. The blocks of ice may be laid up three feet at a time, leaving a space by the wall, which may then be filled and well packed by tramping it hard. Fill the chinks and cover each layer as it is placed. Finish by packing the top very firmly with two feet or more of sawdust.

A ventilator in the roof is essential to the keeping quality of the house.

A CHEAP ICE-HOUSE.

For a small, cheap ice-house, cover a square frame with hemlock boards and batten the seams. Fill the building in the same way as described above. A house ten feet square and ten feet high, well packed, will hold about thirty tons of ice. Paint the boards annually with crude petroleum.

HARVESTING THIN ICE.

Where the climate is mild, and ice cannot be safely left when it has acquired a thickness of five or six inches, the ice is best broken into cakes and thrown into the house, where a man with an axe breaks and fits the pieces by knocking off or battering down all the projecting points, throwing small pieces into the larger cavities, and covering the top with two feet of sawdust. Every day as it settles tramp down the sawdust by the walls and in the cavities on the surface. This must be repeated once or twice a week until the month of May. This will secure a perpetual supply.

ICE MACHINE.

In the South, where ice does not form, the question of supply lies between receiving the Northern crop when abundant, or home manufacture when the market is high. The Twining machine will enable those who require it the requisite facility of supply.

BUTTER-COLOR—YELK.

A bright, glistening, golden color is a distinctive characteristic of the best quality of butter. Such a color is natural, and is not only pleasing to the eye, but suggestive of health and sweetness in the cow, with wholesome food from pasture, field and meadow, indicative of fragrant aroma, delicate texture, and pure, delicious flavor, a satisfaction to the sight, which is not disappointed in well-made butter by the smell or taste. Butter color is derived from the cow's lacteal organs, through her special power of secretion of a yellow oil, the coloring matter contained in the elements of her food. Some cows have the ability to store up coloring matter in large quantities, in their fat and in various tissues of the body. It also exudes from the skin in little shining particles, and can be seen on many Jerseys in great abundance, especially within the ears; also beneath the lower lip, behind the elbow, within the thighs, upon the udder, teats, vulva and escutcheon, and beneath the hair on all white patches. If it appears within the ear, the cow may be considered pretty sure to color her butter well. Many individuals have this faculty so strong, that change of food and the severest hardship from cold cannot change it or diminish its force, for their butter is nearly as golden in February frosts with hay fodder as when pastured in June meadows. The original source of this butter color is the juice, which contains the true coloring matter in green plants—that which gives to young verdure its softest and most refreshing tints, and in luscious, full-grown plants the rich, deep green, an element so marked in its abundance in the months of May and June, where fine meadows and woods abound, that it deserves the name of *greenth*.

GREENTH.

This greenth is called *chlorophyl* by the chemist, and the cow that can store up the most of it and tincture her butter with it every day in the year is considered a prize, if she be otherwise good. The greenth is a compound color and yields only its yellow and orange to milk and butter. Many vegetables, like mangolds, yellow maize and squashes, do not yield much of their color to butter, or at least in so small a degree as to be practically of no value in that respect, so that if one desires to increase the natural sources of butter-color it must be through those materials alone which furnish greenth. To have high-colored butter, then, one must have the best yellow-skinned Jerseys, and that yellow should be rather a rich cadmium orange; and these Jerseys should have succulent food of the richest green color, as many months in the

year as can be supplied with rye, barley, sweet corn and orchard grass, and in winter, green, unbleached hay made from the richest colored grasses, sweet corn and clovers, cut early or before their fullest blossoming growth, and in their richest color. Put the liquid manure, bone meal, ashes and plaster on all the meadows and pastures, and with abundance of plant food you will have luxurious growth and very deep color, and consequently will seldom need to resort to annattoine for a tint.

GREEN HAY.

Let all hay and fodder be cured in such a manner as to retain as much as possible of its green color. It is well to "make hay while the sun shines," but nevertheless the best hay may be made *while* the sun shines, *without the sun shining upon it.*

ORCHARD GRASS HAY.

If the land has been well prepared and the orchard grass seed sown at the rate of three bushels to the acre, it will grow thick and fine, avoiding the bunchiness, harshness and coarseness of thin seeding. When the grass is just blossoming and in its richest green, set the wide-swath mower at work, but always be careful to mow at those hours of the day when the grass is free from any wet of rain or dew. The double-swath mower has extra size driving wheels, large geared, and of superior power, and will cut with one pair of horses twenty acres in a day. A good time to cut is from four to seven o'clock P.M. If the grass is heavy it will take nearly two days to cure it. It should be put into cocks the middle of the following day while it has the heat of the sun, and will cure much faster in heaps than if allowed to remain flat until cool. The next day turn over the whole heaps at eleven A.M. and divide into two or three flakes. In two hours it will be ready for the barn, and should be housed *while it has the heat of the sun*, even if looking quite green and feeling a little heavy. There will be no sourness or smokiness when you come to feed. Get in all hay by four o'clock P.M.

THE MOW.

The deeper the mow the better for all kinds of hay. Let it be air-tight upon the bottom and the four sides.

If the hay is thoroughly trampled and impacted in the mow, and salted, it may be put in quite green, having the heat of the sun upon it, care being taken to make it so firm and close as to exclude the air as thoroughly as possible.

The top may be finished by two or three feet of oat straw or very dry hay, also well-trodden and impacted.

ANOTHER METHOD.

Cut in good weather as soon as the dew is off, and follow with the hay tedder once an hour until it is thoroughly wilted, but yet *green.* Drive the improved hay-cart with loader attached over the field in the hottest hours of the day, so as to secure

it in the mow with the highest degree of absorbed heat. Pack in the barn as densely as it can be trodden down, using a peck of salt to the ton. The old way was to dry it to tinder and let it get wet with rain or dew. The new way is vastly better.

GREEN CLOVER HAY.

Cut the clover in early bloom in good weather, free from dew, run the tedder over it twice and put it into tall, slender cocks *as soon as it is fully wilted.* Cover with hay-caps and let them stand two days if the weather is fair, three or four if rain intervenes. Open the heaps *without any shaking*, by laying them apart in *a few flat flakes*, at eleven to twelve o'clock. Between two and three o'clock put into cocks of double size and let them stand two days with the hay-caps on, then pack in mow by treading each load thoroughly and firmly.

ANOTHER METHOD.

Put into heaps *before it is thoroughly wilted*, say two hours from cutting; let these tall, thin cocks stand covered with hay-caps three days, during which time it will sweat, heat, and cure. By this method it will not become harsh and brushy, but will retain its leaves and green color. The fourth day, at noon, simply turn over the whole heap without spreading, and put into the mow, packing it evenly, after one hour of exposure to the air and sun. Clover must be cured as much as possible without exposure to the direct rays of the sun; and, like all good hay, it must be made on time and in its own time, and gathered in at the hottest hour of the day.

A THIRD METHOD.

Dry the clover upon frames hung in tiers two feet deep, under a shed that has open sides, thus giving it practically no sunshine at all. Pack in the mow as soon as practicable, fourth or fifth day.

CURING CLOVER WITH GRASSES.

Clover will cure better if the ground is seeded with a mixture of grasses, so as to give from one fourth to one third in bulk of orchard grass and timothy, and the hay is cleaner from being kept off the ground. To cure a crop of two or three tons per acre, always cut in good weather, selecting the time when the clover is in early bloom, just after a rain-storm, in clearing weather.

Use a mower that will leave the swath loose and airy, and cut from three to seven o'clock in the evening. The next day at ten o'clock use the tedder, and at two o'clock the same day put up into high cocks and let them stand one or two days, getting them into the barn on a bright, clear day without opening, if there has been no rain.

If during any stage of this process there is threat of an approaching storm or shower, get the hay into cocks as quickly as possible, and put on caps.

In a wet season, clover and grass need more curing than in dry times. Irrigated crops also need more drying. Always cock when the thermometer is highest, and get in hay at the same hour of the day.

Never get in hay after four o'clock.

GREEN OAT HAY.

Select those varieties of oats that do not breed smut. Cut with the reaper just before coming into milk or in first stage of bloom and quite green. Let the swaths lie until thoroughly wilted. Rake and bind in small sheaves, and set in small shocks with hay-caps for four days. Break open the shocks and expose the bound sheaves to the heat of the sun four hours, turning them once, then pack in mow, laying evenly.

ANOTHER METHOD.

Cut with the mower and treat like orchard grass. Many who have tested green oat hay declare it to be excellent for the production of golden butter. The hay-caps may have a short stake to drive into the ground instead of being weighted.

COW-PEA HAY.

The so-called speckled or whippoorwill pea (a bean) is much used in the Southern States, and it would be well to extend its culture Northward. We could not get two cuttings, as in the Gulf States and Mississippi, but one cutting would doubtless prove profitable wherever it will grow. Sow in drills three feet apart, one bushel to the acre, about the first of May ; cultivate to a slight depth several times with a fine-tooth cultivator. Cut when the plant is in the young pod with peas half to two thirds grown. As soon as slightly wilted cure upon frames made of rails, beneath a shed, where they may be placed in layers two feet deep, leaving a foot of space between the several layers for ventilation and thorough curing. This is said by those who use it to be superior to clover for feeding purposes. Pack in the mow as soon as the water is sufficiently evaporated. It may also be treated like clover.

GREEN MILLET HAY.

The soil must be warm, rich, and very finely pulverized for millet. Sow early in June fifty pounds of seed to the acre, to get a thick, fine stand. If the soil and weather are in their best harmony, with abundant rain, it will produce a very dense growth from five to six feet high. Cut with the mower just as the seed is coming into milk or before the heads are fully out, which will probably be early in September, Cure it in the cock, like clover, but the cocks may be much larger, and you will have a bright green, very heavy hay, that will be excellent for the

production of golden winter butter. If cut too late it will be coarse, and very hard to cure.

GREEN MAIZE HAY.

The saving and curing of green corn is a subject worthy of much thought. "Professor J. W. Sanborn entertains the 'emphatic belief, founded on years of practical experience as a farmer,' that Missouri alone wastes each year not less than $20,000,000 net in neglect of her crop of corn fodder. It should be fed in connection with the grain instead of 'selling the latter to be worked up abroad, and throw away its base.'" With the new machines for the crushing and finely comminuting of well-cured cornstalks, the economy of the maize crop becomes of much greater importance than hitherto.

Where the Southern or Dent corn is grown it is the practice with some farmers, as soon as the corn is well filled in the kernel, and the leaves begin to lose their flow of sap, to strip off all the leaves below the ears, to be made into maize hay, while the upper half of the stalk is cut just above the ear, or topped. These are cured in shade and make sweet hay. The Northern or Flint varieties it is customary to cut close to the ground as soon as the kernels are glazed. This gives, if properly cured, a full crop of maize grain and a large amount of excellent fodder, which by the aid of the new machine is converted into a crushed and semi-pulverized condition, whereby it is wholly utilized in feeding.

CURING CORN FODDER.

The curing of corn fodder is of as much importance as the curing of any other grass for hay or the curing of clover. Ordinarily in a dry climate there should be no difficulty in curing the stalks well in the field so that they will keep in the mow. The only item necessary for consideration after cutting is, that the stalks should be well set up in the field, so that they cannot fall down, for if they fall, or lean from the upright, both the grain and the stalks become mouldy and full of decay.

But in a vertical position, curing of both grain and fodder go on to perfection. It is the custom of some farmers to set a stake firmly in the ground, around which are fixed the stalks in bundles, forming *large, circular shocks.*

A machine is needed for cutting the corn rapidly.

A short-handled hoe well sharpened, with which at one stroke a hill of four or five stalks is clipped, is the common method, but a stout cradle will double the speed of cutting. The shocks are best bound very tightly at the top with a cord. The bottom of the shocks is left sufficiently open for ventilation and ripening. If the weather is fine these shocks may be left in the field for many weeks. Corn grown in drills may be cut with a reaper. Give the weather-beaten stalks to dry cows, the bright green to butter cows.

The advantages in this system over the silo are:

1. The work is done at a convenient season after the hurry of hay harvest.

2. The avoidance of the cost of the silo.

3. The sweetness and purity of the fodder as contrasted with the vinegar and offensive odor of ensilage.

4. The better quality of the milk, butter and cheese.

5. The avoidance of the dangers of ensilage in causing debility and abortion.

6. The saving of a full crop of grain.

7. The comminuter or "crusher" prevents all waste and greatly increases the economy of feeding.

. The silo may perhaps be tolerated by and be a source of profit to beef butchers; but I very much doubt that beef rich in osmazome can be produced by ensilage feed. I believe it the part of wisdom for all Jersey breeders who are feeding silo fodder to turn their silos into root-cellars or hay-barns for the storing of sweet, pure, wholesome fodder for their cattle that are too choice to put to any rash experiment. The silo is an adventure that is full of hazard to all dairy breeders, and inexpedient for the perfection of the arts of breeding and of dairying. Good maize fodder may be cut as for the silo and packed in the air-tight mow, after being cured green.

CLEANLINESS AND FILTH.

The progressive dairy farmer should have both a native and a cultivated abhorrence of all filth. Unless the ordinary processes of fermentation of manure-heaps and privies are put under perfect sanitary regulations, disaster will come to the home. There will be a poisonous atmosphere, poisoned wells, poisoned ground, and the dreadful calamities of typhoid fever, scarlatina, diphtheria, untimely deaths, and much terrible suffering and life-long regrets. And also all these dire calamities may be spread to neighboring homes, and to the city marts, and even to distant parts of the world, by poison milk, poison cream, poison cheese, and poison butter.

The necessity of a radical reform in all the matters pertaining to cleanliness at the farm is paramount.

Of all the occupations on this earth, from ruling nations to peddling peanuts, there is not one that is carried on in such a slovenly and slipshod manner as farming. Every sink-spout is a breeder of typhoid fever. The milk-slops and housewash that are poured down in the nearest and most convenient place breed scarlet fever, the privy breeds diphtheria, and the whole vicinity is tormented with myriads of flies bred in the manure-heaps, while rats revel in all this filth, and destroy more hay and grain than the value of all the profits of the farm. Change it all. Make it all clean and sweet. Protect your neighbors and yourselves from all these manufactured diseases. *Never allow a rat, mouse, or fly, to enter one of your buildings.*

Well-made concrete walls and floors keep out rats. Terriers, ferrets, cats, owls,

traps, and skilfully used phosphorus or strychnine will destroy all the rats and mice that dare intrude or that are brought in by hay and grain from the fields.

Fine window-screens and wire-doors keep out all flies. BE CLEAN !

HELP—HELPERS—HIRELINGS.

Most of all, the farmer needs, in his hired help, men and women that are skilful and wholly trustworthy. When the farmer attempts to conduct his business with untrained and careless hirelings, he soon finds his farm-work in disorder and everything in the way of destruction. He says, "This choice Jersey calf is to be well fed, and I won't trust the boy or the hired man, I'll do it myself." "This field is to be thoroughly tilled and carefully seeded with grass; I can't trust my hired man, I'll do it myself." The consequence is that the attempt to do everything requiring care or consummate skill becomes too great a burden, and *he must also shirk it, for he cannot do everything.*

The true helper is a rarity. The hireling is to be found everywhere, and no greater opprobrium can attach to any man than to give him the stigma of "an hireling." "He fleeth *because* he is an hireling." He cares for nothing but his wages, and is indifferent to the fact that his employer's prosperity depends upon his faithfulness. Helpers and not hirelings are needed—trained, skilful helpers. The interests of the employer and the helper are mutual. Let the wise employer keep and train his own help, and care for all their interests. Let him encourage them by rewards for well-doing, or punish by penalties, and rebuke for shortcomings. Let him give rewards for care of stock and fine productions, either by testimonials or by a share in the profits of the business—and, above all, *by kindly words of commendation* for all well-doing. How encouraging to the true and faithful are the words, "Well done"! Let the helper respond by still striving to excel.

REST AND RECREATION.

The farmer and his helpers must each day have the work planned so as to give the requisite number of hours to labor, to rest, and to sleep. There must be *eight to twelve hours of good hard work over and beyond all the interruptions and hindrances; there must be eight hours of good, refreshing sleep;* the other four to eight hours are given to food, to contemplation, and to planning, to self-improvement, to reading, and also include all the voluntary interruptions and irregularities.

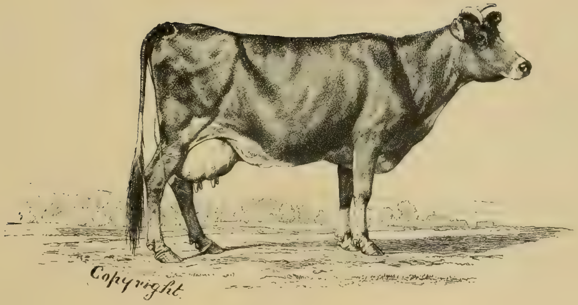
In all Christian countries the first day of the week is officially recognized as a day of release from all work except that which is indispensable. The day is regarded by Christians as the Lord's day, in which are to be made special observances of commemoration and divine worship and the declaration of the gospel or good news

of salvation to all men who will hear. The farm-work should be so arranged as to give a part of the Lord's day to each man to attend upon divine worship and preaching, if he will, and the employer himself should set the example in so doing. The day is one of high and gracious privileges, of which no man has a right to deprive another, but which all men everywhere are enjoined to regard with pleasure, and avail themselves thereof with moral and religious benefits ever accruing.

The employer whose helpers delight in regularly attending Christian worship shall find that his interests will be well regarded.

The man that smokes will be lazy and shiftless, and unless very stringent rules are adopted to prevent it, may some day ignite the hay-mow.

The whiskey-drinkers and swearers are not fit to be trusted with the care of Jerseys, for they will always maltreat them when angry.



FAVORITE OF THE ELMS 1656.

HOLLY GROVE HERD.

JOHN I. HOLLY, PLAINFIELD, NEW JERSEY.

PART FOURTH.

DAIRY FARMING AND THE WEATHER.

The weather, in its relations to the growth and the harvesting of billions of dollars' worth of hay and grain in good condition, also to the care and health of animals, its effect on their breeding and stamina, as well as upon all the productions of the dairy, offers a vast field for observation, profound study, and availability of practical knowledge. By the forecast of the weather an individual may save in perfect condition a large crop which otherwise might be either a partial or a total loss. In the aggregate, when a system of observation and weather signals shall have been adopted throughout the country, the saving of these amounts will insure great prosperity.

In the United States Agricultural Report for 1881 and 1882 an estimate of the value of crops for the country in 1881 is given as follows:

Hay	$415,131,366
Indian Corn	759,482,170
Wheat	456,880,427
Oats	193,198,970
Barley	33,862,513
Rye	19,327,415

And yet the statistician says: "While a crop failure, or such scarcity as to limit necessary consumption of food, is practically unknown in this country, the nearest approach to it for many years occurred in 1881. It affected all the cereals except oats, the potato crop to a very serious extent, and reduced the production of cotton more than a million bales. Five consecutive seasons, from 1876 to 1880 inclusive, produced crops of more than average yield, while the same period in Western Europe was attended with medium or low productions in nearly all branches of farm industry, but especially in wheat.

"In 1875 our wheat product was reduced, while the corn crop was above an average.

"In 1874 the reverse was true, wheat making an average crop, and corn nearly as bad a failure as in 1881. In 1869, corn was a comparative failure, while wheat produced more than an average yield. In no season since the inauguration of crop reporting has there been so general disaster, involving corn, wheat, barley, buckwheat, and rye, oats alone being exempt from loss, as 1881."

The corn yield was twenty-seven per cent. less than 1880; the wheat twenty-two per cent. less, and the lowest ever reported; rye twenty-seven per cent. less; barley nine per cent.; the aggregate product of all cereals twenty-four per cent. less than that of 1880, the result of a cold, backward spring. Consequently, a very late spring would seem to necessitate the planting of a much greater area, from one fourth to one third in extent, with still more careful culture, in order to meet the demands of the country in food supply.

The value of the green pasture grass is probably greater than that of the hay crop.

With the rapid increase of population it becomes necessary to adopt improved methods of agriculture, not only to increase the growth and yield, but to insure a safe harvest of what is grown. A general knowledge of the atmospheric changes will aid much, while a Government system of daily weather reports for all parts of the continent will result in the saving of a vast amount of material that is now wasted. The subjects of Drouth, Irrigation, Drainage, Backward Seasons, Diversity of Crops, will receive the attention they deserve, and aid farmers in determining plans of operation in all that relates to Agricultural Economy. In order to give a correct knowledge of the subject as far as yet understood, I have deemed it best to present to my readers "The Atmospheric System" of Thomas B. Butler, which I have found it necessary to do in a condensed and slightly modified abstract.

THE ATMOSPHERIC SYSTEM.

"The weather is the existing state of the atmosphere in any specified locality, and the changes there occurring from one state to another in regard to—

"1. The weight of the atmosphere.

"2. The temperature.

"3. The direction and force of winds.

"4. Clearness or clouds.

"5. The degree of moisture.

"6. The state of precipitation, mist, rain, snow or hail.

"7. The electrical state.

PROPOSITION FIRST.

"The normal state, in the temperate zones, is clear, still, dry weather.

PROPOSITION SECOND.

"Changes of the weather and all the phenomena connected with them result from one of several distinct, organized atmospheric conditions, formed in the atmosphere of the tropical zone, and passing from thence over our zone, or formed in our zone of materials and by influences emanating from the base of the system in the tropical zone.

PROPOSITION THIRD.

"All the conditions referred to result from the operation of fixed and intelligible laws, pertaining to a general organization of the atmosphere, or an atmospheric system, which has its base in the tropical zone.

"The various states which are a departure from fair weather result from a series of organized, varied, successive, passing, atmospheric conditions.

THE STORIES OF THE ATMOSPHERE.

"The atmosphere has three distinct stories in regard to clouds and winds.

"They are constituted by the interposition of a current of warm, rain-bearing air from the tropics. It enters over the United States from the southward in large volume, at different points, in different seasons of the year. It moves to the northwest in the tropics, and curves between 25° and 35° latitude, according to season of year, moving afterward to the northeastward. It varies in quantity. Sometimes it is not more than a thousand feet deep; again it may form 'a river in the air,' ten thousand feet in depth.

"Where it enters upon the continent its lower surface may be half a mile to a mile above the earth. Gradually descending it will come nearer at 40° north latitude and in the Western States. It seems to be elevated in passing over the Alleghanies, and the easterly wind blows in under it in greater volume after it has passed elsewhere.

"The tropical current constitutes the middle story of the air. All below it is the surface story, all above it the upper story.

"The middle or 'trade' story may be seen in a large proportion of the days of the year, and known by its elevation, direction, and the character of the clouds which form and float there.

"At the latitude of 40°, when unexcited, it moves at the rate of about twelve miles an hour, but its motion is sometimes less, often much more; during intense storms, twenty-four miles an hour, or more.

SURFACE-STORY CLOUDS.

"There are three kinds of cloud and vapor in the surface story: Fog, Scud and Mist.

"*Low Fog* forms at the surface from one to two hundred feet. *High Fog* forms in the night from fifteen hundred to two thousand feet high, and is generally dissipated by ten o'clock in the morning. Scud clouds form and float in all the winds of the surface story which blow with notable force. Scud form in all the winds which are parts of *Conditions*. Such winds usually blow from northeast, southeast, northwest and southwest. This results from the fact that the *Conditions*, after they curve in a low latitude, move in a northeast direction, and the lateral winds necessarily are northwesterly and southeasterly.

"The northeasterly wind moves in under the storm, in opposition to its line of progression. The southwesterly follows after the same line. The northeasterly wind is very common east of the Alleghanies, and less common west of them.

"The Northwest Scud are seen, according to season of year, in every conceivable form.

"In the summer they assume rounded heaps, and are white, unless very dense, when the under surface is dark. In autumn they are less rounded and more elongated and horizontal, and float in larger, darker, irregular masses. In the early spring and late fall they are often very dark and gloomy, coalescing and covering the sky, and dropping, for a brief period, flurries of snow, but they may always be known by the direction and character of the wind they float in, and their relation to some stormy *Condition* which has passed by and cleared off. You will have fifty opportunities in the year to observe them.

"The Northeast Scud may be seen running under the outlying, advance condensation, toward the southwest, and the body of the storm approaching from that quarter. They are almost always in irregular patches, and always of an ashy-gray color.

"As the storm approaches nearer, these masses of scud become larger and denser, and before rain sets in they wholly fill the upper part of the surface story, and obscure the storm clouds from view. The northeast wind and scud continue to move southwest, until after the body of the storm has passed to the eastward, the rain ceased, and the layers of other kinds of clouds are visible in the trade and upper stories through the dissolving scud. Those who live east of the Alleghanies will have at least twenty opportunities for observing the Northeast Scud in the course of a year.

"The Southeast Scud closely resemble the Northeast, but are not so uniformly ashy-gray. These float in the southeast wind, toward, under, and frequently quite across the long, stormy conditions to which they are incident. The opportunities for observing the Southeast Scud are less frequent than the Northeast.

"The Southwesterly Scud are less distinct than the others. When they blow from the southwest, toward and under a belt of showers, in the summer, they very much resemble in form and color the scud of the easterly winds. But when, after a storm or belt of showers has passed by, and the wind is hauling or veering through the west toward the northwest, the scud become whiter and more regular in form.

TRADE-STORY CLOUDS.

"With the exception of mist, trade-story clouds are all of the STRATUS form, or more or less dense horizontal layers of a dark, sombre hue. They are all rain-bearing clouds, and precipitate the moisture which they bring from the tropics. There are three forms. The *Cirro-Stratus*, 'mackerel sky,' is seen in the incomplete condensation which appears in front and at the sides of the body of a storm. As these bands of Cirro-Stratus coalesce before the rain reaches us, they form a dense unbroken *Stratus* which is often visible in spots between the flying masses of scud. It is from the stratus that we obtain most of our rain, in the northeast and southeast storms of the autumn, winter and spring. In the summer most of the rains come in the belts of showers, which fall from the other form of trade-story cloud, the *Cumulo-Stratus*, with a dark, wide, flat base, surmounted by swelling heaps of fleecy whiteness.

"It is among the masses of Cumulo-Stratus, in such a belt of showers, that the lightning plays and the thunder is heard; and it is from the base of some Cumulo-Stratus which settles down into the surface story, that the lightning descends and strikes upon the earth; and it is from the rounded thunderhead of the same cloud that the lightning flashes up, to the layer of upper-story clouds above; and in the chamber between these two stories, that the thunder reverberates and rolls, till it dies away in the distance.

CLOUDS OF THE UPPER STORY.

"The clouds of the upper story of the air, with the exception of mist, are CIRRUS or woolly clouds. They are variable in form, always white and thin, and generally fibrous or thready, with slender filaments, contrasting with the azure of the sky, though sometimes misty and without observable form, and at others in thin sheets or parallel bands, and always the highest clouds to be seen.

"The *Fibro-Cirrus* consists of curled wisps, or 'mares' tails.'

"The *Linear-Cirrus* consists of long layers of horizontal threads, often seen as the outlying advance condensation of a northeasterly storm, approaching from the west and extending in the same general direction.

"A third form is the *Misty-Cirrus*, consisting of thin, misty, nebulous clouds. A rarer form of cloud, seen, perhaps, half a dozen times a year, is the *Cumulo-Cirrus*,

that consists of small, isolated heaps, like fleeces of snowy wool. This appears in long drouth or set fair weather.

TABLE SHOWING NATURAL ORDER OF CLOUDS.

Clouds	Story
Misty or Nebulo-Cirrus. Fibro-Cirrus. Linear-Cirrus. Cumulo-Cirrus. Mist.	Upper Story—CIRRUS. 3 to 6 miles in depth.
Cirro-Stratus. Cumulo-Stratus. Storm-Stratus. Mist.	Trade Story—STRATUS. 1 to 3 miles in depth.
Scud. High Fog. Low Fog. Mist.	Surface Story—SCUD. 1 mile in depth.

"The Scud clouds are driven in all winds, from a fresh breeze to a hurricane, at a height from half a mile to a mile. The Cirro-Stratus are from one to two miles high; the Storm-Stratus is about a mile high. The Cirrus clouds are from three to ten miles high. Fogs form at night in still air, or in winter storms, in thaws by day or night, and in storms at all seasons.

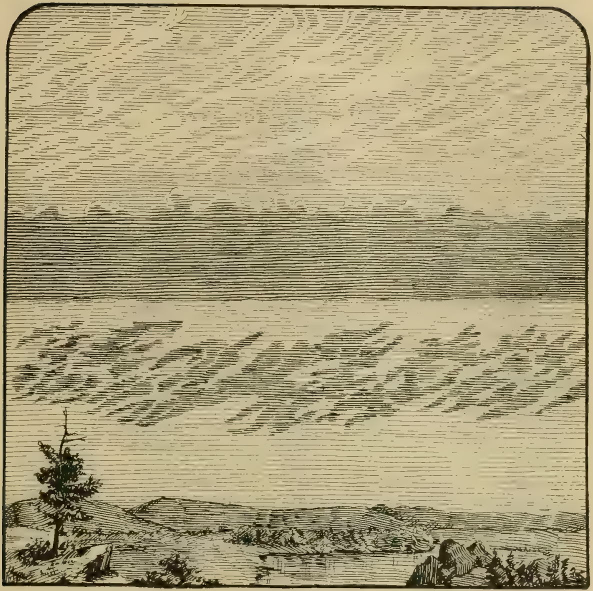
STORM CONDITION.

"The body of a storm is composed of three strata of clouds: a layer of *cirrus* in the upper story; a layer of *stratus* in the trade story; and in the lower story a layer of surface wind, blowing in under the other strata, humid and moist, and filled with patches or dense masses of *scud*; and all these work and act together, and move together, as relative parts, to produce and deposit the rain.

THE SOUTHEASTER AND BELT OF SHOWERS.

"The diagram on page 441 exhibits the position of a Southeaster, which, entering upon the continent over Texas, and curving to the northeastward, has crossed the upper part and arrived at the lower part of the Mississippi River, and is drifting to the eastward to cover the entire territory of the United States and Canada, east of that river, and pass off on to the Atlantic.

"It will be seen, by the direction of the arrows, that it has lateral southeast and northwest winds, the arrows in the body of condensation or central portion of the



THE THREE STORIES OF THE ATMOSPHERE.

Upper, Cirrus; Middle, Stratus; Lower, Scud.

storm, indicating that that portion is moving to the northeast, which is true of all the various conditions, as a rule. There are some exceptions.

" The dotted lines on the northwest portion of the storm indicate that portions of it have moved up to the northeast and left the surface uncovered, showing the manner in which such storms generally 'clear off' from the northwest. The shading down at the Gulf indicates the accession of additional portions upon its eastern side. In such a condition the southeast lateral wind often blows a gale, and its direction is nearly at right angles with the axis of the storm, and under and *across* the belt of condensation. Sometimes, in autumn or winter, the northwest wind may blow in *under the southeast* wind, a part of the way, and turn the rain to snow.

" Anterior to the approach of such a storm, within influencing distance there is

a fair, pleasant, still and normal day, sometimes called a 'weather-breeder,' with high barometer. As soon as the influence of the storm reaches the place and is felt, the barometer begins to fall, the air moves toward the storm, and the wind freshens from the southeast and fills with scud, the thermometer rises, the air grows damp, approaching cloud condensation (cirrus) is seen in the west and northwest, and men and animals feel sensibly the approach of the storm.

"In the *belt of showers*, the commencement of the fall of rain is nearly coincident with the arrival of the eastern abrupt edge of the cloudy portion of the condition over the place. In the condition we are now describing, the cloudiness may extend from one to two hundred miles to the eastward of the rain, gradually thickening from the eastern edge to the part where rain is falling, and the western edge may terminate abruptly. In all other respects, and indeed in all their essential features, the two conditions are alike, and belong to the same general class. The summer condition is narrower and less extensive than those of autumn.

"The number of this class of conditions (taking a period of ten years) which occur in each year, at any given point east of the ninety-fifth meridian, will not vary, on an average, much from thirty, and, if anything, exceed it. All, or nearly all of our thunder showers, so called, are *contained in* and are *a part* of them.

"In the course of nearly fifty years of habitual and close observation in different parts of the country, I have not seen a dozen *single, isolated* thunder showers.

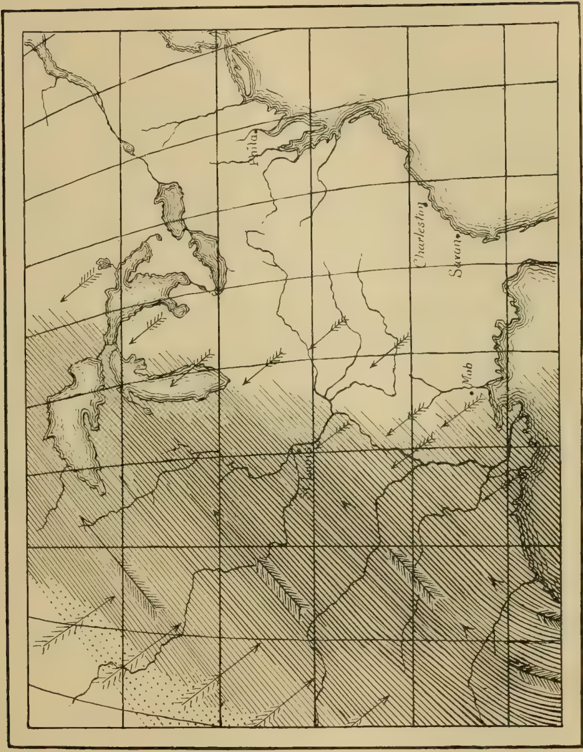
"Slight showers sometimes occur on the eastern or western edge of the belt before the main body has arrived or after it has passed, which seems to be isolated, but they are a part of the condition.

"Of the thirty or more, at least one fifth do not precipitate at all over the eastern part of the continent. Whether because their energy is spent before they reach us, or because they never were sufficiently intense in their character, it is not always easy to determine. Probably sometimes from one cause and sometimes the other. These feeble conditions are most common during summer drouths. They are perfectly distinct—have *all* the *elements* and go through *all* the *motions* of the most intense conditions of their class, but feebly and deceptively. They excite and disappoint hopes, and are the cause and foundation of the proverb that '*All signs fail in a dry time*.' Hundreds of thousands of dollars are lost by farmers, by a single rain, in the value of their hay and the cost of redrying it, which might be saved if they understood the thirty-six hours' *perfectly intelligible warning* which precedes it.

"Belts of showers present the following succession of phenomena in summer:

"1. Still, warm weather, one or more days.

"2. Fresh southerly wind, one or more days; if more than one, dying away at the S. W. at nightfall, but continuing into the evening of the day before the belt of condensation arrives.



THE SOUTHEASTER.

(Left-hand side of cut is north.)

"3. Belt of condensation, with or without rain or showers, with the easterly wind blowing axially, if the condensation is heavy and the belt wide; westerly, if the condensation is feeble or the belt narrow, the clouds moving about E. N. E.

"4. Cooler air, light N. W. in summer, heavy N. W. in autumn, winter, and spring.

"And the next period:

"5. Still warm weather or light airs.

"6. Southerly wind, fresh.

"7. Belt of condensation.

"8. Cool northerly wind.

"And so on, successively, unless broken in upon by some other class.

"Sometimes these periods are exceedingly regular, at other times other classes prevail.

"I have much reason to believe that this is the *normal, periodic* provision for condensation of our portion of the northern hemisphere, and probably of every other where rain falls regularly in the summer season, and that the other classes are exceptions, as the hurricanes are exceptions to the normal condition of the weather everywhere.

"Perhaps in some seasons, during the northern transit, the exceptions may equal the rule, but I do not remember such a season. In other years nearly all the storms are of this character. Thus, Dr. Hildreth, in Silliman's Journal for 1827, speaking of the year 1826, in a note to his register of that year, says: 'There have been, this year, an unusual number of winds from N. or N. W. Nearly every rain the past summer has been followed with winds from the northward, when in many previous summers the wind shifted to the southward after rain.'

"The belts of showers are sometimes composed of imperfectly connected masses of cumulo-stratus, and when the break between them passes over any given point, a shower will pass to the north and another to the south of it, and people say, 'The showers go round us.' In such cases the observer must look in the southwest, and not at the west or northwest, for the particular portion of cloud which is to precipitate rain upon his locality.

"There is one other peculiarity: the *lateral wind* is always the strongest which blows from the surface that is *most moist*.

"This class of *conditions*, belts of showers, is the most common everywhere.

THE NORTHEASTER.

"This condition is a distinctly marked one on the east side of the Alleghanies, but not as prevalent or distinctly marked on the west side. The distinguishing feature is a thin stratum of northeast wind, which sometimes blows a day or two, toward the storm which is approaching from the southwest, before the storm reaches us. In such cases, the storm is very wide and presents a wide front to the eastward. I am inclined to think that the wind is always northeast, where the belts have a width of five hundred miles or more on the east of the Alleghanies. This wind is very frequent in the spring, when the focus of the storm is south of us, and its northern edge extended up over us, and the condensation is not sufficiently dense to

precipitate. In such cases, we may get no rain in New England, but have what is termed 'a dry northeaster.'

IRREGULAR CONDITIONS.

"There are certain irregular conditions which occasionally occur. Thus the whole eastern part of the continent is sometimes covered for days by cloudiness, with here and there irregular patches of snow or rain in winter and spring, or showers and perhaps tornadoes in summer. These long spells of extensive condensation and dampness, or irregular rain and irregular winds, are occasional and exceptional, and of course defy distinct description or classification. But it will be observed that they generally begin with southerly or easterly wind and clear off from the northwest.

THE HURRICANE CONDITION.

"This term is applied to violent gales at sea, and particularly those that originate in the tropics. They are most common in the warm season. The Atlantic hurricanes begin to the east of the Caribbean Sea, sweep across the eastern portion of the West Indies and along near the coast of our South Atlantic States, gradually widening out, maintaining their action many days, until they pass into the North Atlantic, beyond the track of commerce and observation.

"The most violent hurricanes occur upon the land, and vary in width from one mile to fifty, and under the whole width the lateral winds are masked by a most violent and destructive wind which follows the body of cloud and its line of progress from westward to eastward.

THE TORNADO CONDITION.

"Tornado is applied to the condition upon land, but it is called water-spout upon the sea.

"1. It occurs during a peculiarly sultry electric state of the trade and surface atmosphere, and at a time when thunder showers are prevailing in and near the locality, as an incident of the showery condition, and at any period of the year when such a state of the atmosphere exists.

"2. There is always a cloud above, but very near the earth, between which and the earth the tornado forms and rages. It is usually described as a black cloud, ranging about one thousand feet or less above the earth, often with a whitish shaped cone projecting from it, and forming a connection with the earth; at intervals rising and breaking the connection, and again descending and renewing it with devastating energy. Its width at the surface varies from forty to one hundred and eighty rods—the most usual width being from sixty to ninety rods. Sometimes when wider, they have more the character of thunder-gusts, and are brightly luminous.

"3. Two motions are usually visible, both ascending, one near the earth and in the middle, and a gyratory one around the other.

"The latter is rarely felt, or its effects observed near the earth. Occasionally, and at intervals, objects are thrown obliquely backward by it.

"4. It is composed, at the surface of the earth, *of two lateral currents*, a northerly and a southerly, varying in direction, but at right angles in most cases, although not always, with its course of progression, extending from the extreme limits of its track to the axis; which currents are most distinctly defined toward the centre and upward. These currents prostrate trees, or elevate and remove everything in their way which is movable. The south current is always the strongest, and often crosses the axis and curves backward as it rises from the surface, and ascends a little in advance of the other, and covers the greatest area. The two lateral currents appear always to be the principal actors, except when it widens out and assumes more the character of a straightforward gust.

"5. This cloud and its spout move generally with the course of the counter-trade in the locality—*i. e.*, from some point between S. W. and W., to the eastward, but occasionally a little south of east.

"6. Several instructive particulars have been observed and recorded.

"*a.* No wind is felt outside of the track, as those assert who have stood very near it, and as its effects show.

"*b.* The track is often as distinctly marked, where it passed through a wood, as if the grubbers had been there, to open a path for a railroad. Branches are broken or twisted off, while not a leaf is disturbed on the side of the tree out of the track.

"*c.* As the spout passes over water, the latter seems to boil up and rise to meet it, and flow up its trunk in a continued stream.

"*d.* As it passes over land, things appear to *shoot up* instantaneously into the air, and into fragments. Doors, gables, and roofs may be snatched off on the leeward side and unaffected on the windward side of buildings.

"*e.* Articles of clothing have been carried through open doors and chimneys, to a great distance.

"*f.* If there be a discharge of electricity up the spout from the earth, like that of lightning, the intense action ceases for a time or entirely.

"*g.* Vegetation within the track is often scorched and killed.

"*h.* The active agent has been known to *seize hold of a chain attached to a plow and draw the plow about, turning the stiff sod for some distance.*

"*i.* In passing over ponds, all the water and fish have been scattered to a great distance.

"*j.* The barometer falls but little in its track.

"*k.* Persons have been carried far and set down uninjured.

"*l.* Buildings on posts escaped undisturbed.

"*m.* A chisel was taken from a chest of tools and stuck fast in the house-wall.

"*n.* Fowls were completely stripped of feathers and unharmed.

"*o.* Articles of furniture have been found torn in pieces.

"*p.* Frames taken from mirrors without breaking the glass and nails drawn from roofs without disturbing shingles.

"*q.* Hinges taken from doors; *mud from the bed of a stream*, and let down upon a house, covering it completely; a farmer taken up from his wagon and carried thirty rods, his horses carried as far in the opposite direction, *the harness stripped from them*, the wagon also carried away and *one wheel lost;* timber and boards driven deeply into a hillside, *as no force of powder could have done.*

"From Mr. Stoddard's description of the Brandon tornado, where an oak three feet in diameter was shivered to fragments, and more than fifty thousand trees prostrated or broken by it in less than half an hour, the estimated speed was one hundred and seventy-three miles an hour; and a section of it one half mile wide and one hundred feet high exerted a force equal to half the steam power on the globe. Among a long list of incidents illustrating its peculiar force, '*a board was driven three feet into a charred oak stump.*'

"The Harrison tornado had an estimated speed of three hundred and forty miles an hour; the Mayfield tornado a velocity of six hundred and eighty-two miles an hour.

"Tornadoes, although occurring occasionally over all the Eastern States, in the Atlantic system of conditions, nearly all have occurred at or south of the then location of the focal path. In the few cases where they have occurred north of the focal path, it has been during very warm, intense southeast thaws.

"It is impossible to estimate satisfactorily the average number which have occurred each year. The forests of the Mississippi valley are scarred with them. An average of ten a year would be a low estimate. Some of them have been very destructive to human life, and they constitute one of the dangers of the east, as earthquakes do in California; but the tornadoes are the greater of the two dangers.

"They do not occur in the Pacific system.

THE THREE NORTH AMERICAN SYSTEMS OF CONDITIONS.

"There are three distinct and diverse systems of atmospheric conditions passing over this continent in distinct and different paths.

"The ATLANTIC SYSTEM, which consists of *conditions* that originate upon the Atlantic Ocean within the tropics, the Caribbean Sea, the West Indies, and the Gulf of Mexico, or form in the equatorial current, which comes from that part of the tropics, and, moving north and northwest, enter upon the Southern and Southwestern States of the Union, curving and moving to the northeast, supplying the Eastern and Central States with rain.

"The PACIFIC SYSTEM with its *conditions* originating upon the Pacific Ocean and moving in upon the western coast, supplying California and the Northwestern States and the British Territories and Alaska and the country northeastward of them with rain.

"The CENTRAL SYSTEM is a part of the tropical central belt of rain which surrounds the earth, and which moves up in summer far enough north to cover some portion of Florida and the Gulf Coast, the West India Islands, Southern Mexico and Central America.

"The path of the *conditions* in this central tropical belt is from eastward to westward, across Southern Mexico and Central America and out into the Pacific Ocean.

"The path of the Atlantic *conditions* is northward from the Gulf States, curving to the northeast and passing off on the North Atlantic.

"The path of the Pacific system of conditions is northeastward from the Pacific, across the northwestern part of the continent, into the Arctic Circle.

"*To these different systems of conditions and their diverse paths we owe, fundamentally, the diverse character of the climates of America.*

"Thus, the eastern portion of the United States is largely supplied with moisture by the Atlantic conditions. The western coast from San Diego to the Arctic Circle is supplied—California moderately, and Oregon, Alaska and the country east of them abundantly—by the Pacific system. Southern Mexico and Central America are abundantly supplied during their rainy season by the central belt which moves up over them in summer. Intermediate between these three systems, Lower California and Northern Mexico, the Valley of the Gila, Western New Mexico, the Staky Plain, the Valley of the Colorado, Utah, and the territory east of the Rocky Mountains, and west of the one hundredth meridian, are in some places nearly, and in all, comparatively dry or desert. Both the Atlantic and Pacific systems reach them by an extension of the paths of their conditions at particular seasons of the year, but those extensions are for brief periods, temporary and exceptional—the Atlantic extending up upon a part of them in summer, and the Pacific system reaching down on a part in winter.

"In this diversity of conditions and in their paths, we shall find law, order and organization, and we shall find also an explanation of all the phenomena and peculiarities in the climatology of our country.

FOCAL PATHS OF CONDITIONS.

"The focal paths of the conditions are the paths in which the greatest number of conditions, or the most intense conditions, or the focus of precipitation in the conditions, pass, for the time being, over the country. Thus, to speak generally, the path of the Atlantic conditions is upon the southeastern portion of the United

States, and there the greater number of those conditions, or the most intense of them, or the focal precipitating parts of those which spread all over the Eastern States, are found.

CHART OF WINTER RAINFALL OF A PART OF THE UNITED STATES, 1854.

"During the months of December and January the focal path is descending rapidly to the southeast and east. It is not until after the 1st of February, and not always so early as the middle of that month, that the conditions begin to extend their paths to the west, over the Gulf Coast and States, and to the northwest and north, as they curve to the northeast. This chart does not show the lines and rainfall when the focal path is at its greatest descent in February.

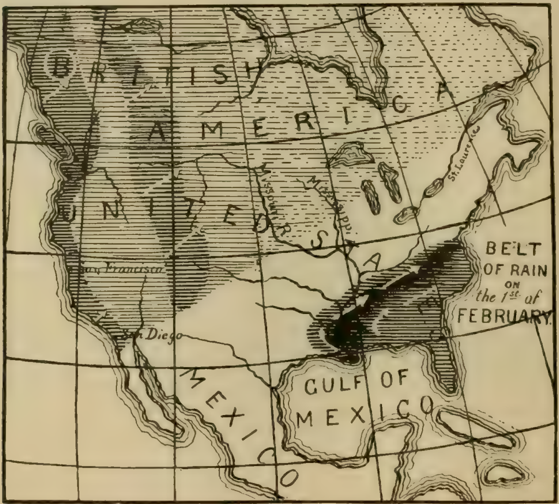
"From its position on the 1st of February the focal path moved to the west and north, month by month, until it attained its highest elevation about the first of August, followed from May 1st by a gradually extended drouth.

"It is generally cool or cold west or north of the focal path, *when concentrated*, and always *cool* or *cold* when the *focus* of a storm passes to the *south* or southeast of a place, and *warm* when it passes to the *north* or northwest. In the first case the

storm *clears off cold*—the wind hauling *through the north* to the northwest, as the focus of the storm passes by to the south.

"In the second case the wind hauls round by the south, as the focus of the storm passes by to the north of the place, and it clears off from the southwest warm.

"When the latter becomes the *rule, summer sets in.*



FOCAL PATH IN FEBRUARY, 1854, ALSO PATH OF THE PACIFIC CONDITIONS.
(*Arrows indicate the direction of the Conditions.*)

"In the Pacific system, the conditions all enter upon the coast from the southwest and move northeasterly, while the attendant winds blow from the southeast and south with a strong, steady force, but all the conditions are less intense than in the Eastern States.

"Gales are uncommon; thunder-storms rare—not more than two or three times a year in California.

"The conditions partake of the Pacific character of the ocean.

"The third system of conditions is not directly connected with the other two

GILDEROY 2170.

AT 9 YEARS OLD.

Noble Type.

FERRYCLIFFE HERD.

DR. H. M. HOWE, BRISTOL, RHODE ISLAND.

systems. They consist almost wholly of limited and isolated thunder-showers, passing frequently and rapidly over the track, giving dashes of rain in large drops and pouring masses for a brief period, and are gone, but the aggregate amount of rain which they deposit during the rainy season, even during the brief period they are over the Gulf Coast, is very large.

FOCAL PATH IN MARCH, 1854.

(Arrows indicate the direction of the Conditions.)

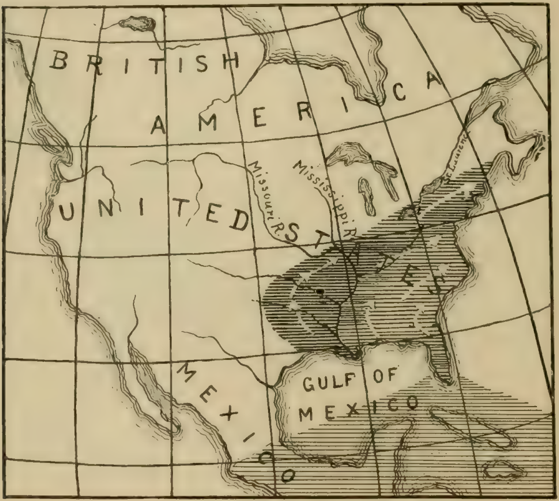
THE GREAT CENTRAL CONDITION OF THE EARTH.

"1. This condition consists of a central body known as the central belt of rain, and two areas or wings of wind, known as the trade-winds—the whole together having a westerly movement.

"2. The trade-wind south of the body moves from some point between east and south, toward a corresponding point between the west and north, and the trade-wind north of the body moves from some point between north and west, toward a corresponding point between south and west.

"3. The central condition has an average breadth of about 50°, and a transit north and south averaging more than 25°. Nearly one half of the central portion of the globe is therefore covered by it, at some seasons of the year.

"4. The central portion or body, averaging more than five hundred miles in width, precipitates rain wherever it may be, and gives to the tropical portions of the earth, as it passes over them in its transits, their rainy seasons.



FOCAL PATH IN APRIL, 1854.

(*Arrows indicate the direction of the Conditions.*)

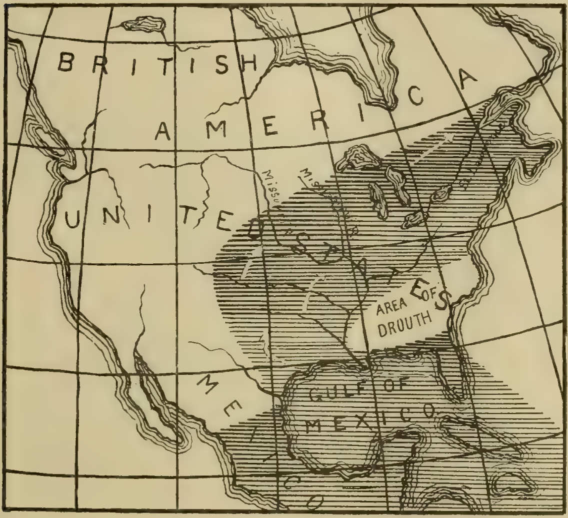
"5. The areas covered by the trade-winds, while so covered, are as a rule dry, except as occasional storms or showers, issuing from the central belt in the trade, precipitate upon them.

"6. The polar zones of rains recede before the advancing areas of trade-winds, and return after them as they retire.

"7. Surfaces which are not covered by the transits of the central belt of rains, nor the tropical extension of the polar zones of rains, continue dry through the year, and constitute the principal rainless deserts of the world.

" 8. The trade-winds blow with substantial constancy night and day, when not interrupted by passing storms, and contain scud, and both winds and scud resemble the wind and scud of approaching or passing conditions in the polar zones.

" 9. On the west side of the Atlantic, and also on the west side of the Pacific Ocean, the southeast trades exist in great strength and volume, and blow as surface winds over latitudes which would otherwise be covered by the northeast



AREA OF DROUTH IN MAY, 1854.

(Arrows indicate the direction of the Conditions.)

trades, up to and connecting with the polar zones of rains. These two exceptional and remarkable volumes of trade give a large and exceptional supply of moisture and fertility, and a peculiar climatology to southeast North America and southeast Asia. And in these remarkable volumes of trade originate the intense hurricanes of the West Indies and the typhoons of the China Sea and Bay of Bengal.

" 10. Where the southeast trades originate on arid areas, like that of Australia, corresponding areas under the north polar zone of rains, like those of southwestern

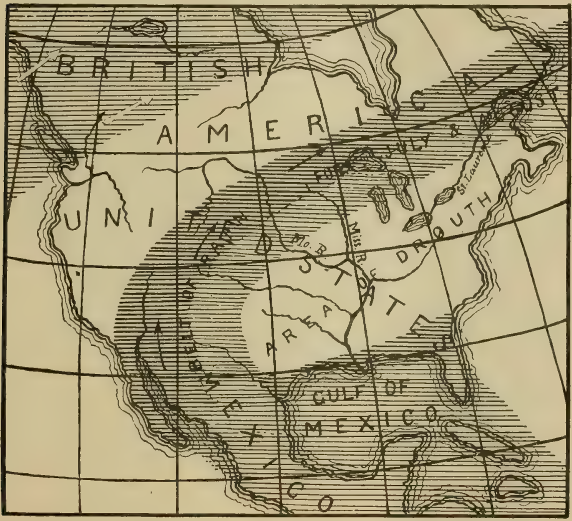
Asia, are dry. And where they originate on the continents that are well watered, areas under the same polar zone are less perfectly supplied with moisture than those supplied by trades which originate upon oceans. And where they originate upon continents like that of South America, or upon oceans, and are met in their path by lofty mountains, corresponding areas, like those of southwestern North America, and the Desert of Gobi in Asia, and Peru in South America, are found.

AREA OF DROUTH IN JUNE, 1854.
(*Arrows indicate the direction of the Conditions.*)

"11. The body of the central condition is composed, first, of an overlying stratum of cirrus and cirro-stratus, extending in a more misty form, to a greater or less extent, out over the trades. This stratum is usually misty or fibro-cirrus in the morning, becoming dense and assuming a cirro-stratus form as the day advances. Under this stratum the trades pass and afterward overlie each other, and in the trades occasionally—though rarely in the morning, but generally in the afternoon or night—thunder-showers form, and furnish the rains peculiar to the belt. These showers have a westerly progression, corresponding to that of the trade in which

they are formed. Beneath the trades where they meet and pass each other it is either calm or there are squalls or gusts or slant winds, incidental to showers or storms, as everywhere.

"12. The northern transit of the condition is usually completed about the 1st of August, and the southern transit commenced before the middle of that month. So the southern transit is usually completed about the 1st of February, and the



SITUATION OF THE FOCUS OF PRECIPITATION IN JULY AND AUGUST, 1854.
(Arrows indicate the direction of the Conditions.)

northern transit commenced before the 15th. But in respect to these, and also in respect to the rapidity and extent of the transits, there are some irregularities, occasioned by a cause which could not be considered without anticipating.

"13. There is no 'vortex' in the central belt.

"The theory of Halley was originally but a mere assumption, and it is not supported by any facts since discovered. Observation, analogy, and every known fact, when properly understood, are inconsistent with and adverse to it."

ANNUAL RAINFALL OVER PART OF THE UNITED STATES.

DROUTH.*

"From the action of the central condition, all our incidental conditions, with their attendant phenomena, result; and irregularities in the movements and operations of the central condition produce corresponding irregularities in the polar zones. One of the most noticeable and important irregularities to which we are subject is that of drouth. When extensive, *unseasonable*, and long-continued, drouths may, *prima facie*, be attributed to irregularities in the action of the central condition; for as our fall of rain at any given point depends mainly upon the *volume* of counter or upper trade *passing over it*, any irregularity in the central

* See maps.

condition, which interrupts the usual supply of *that trade* at *that point*, must necessarily produce a drouth there.

"There are four classes of drouth of extensive character, which can be directly traced to irregular action of the central condition. The first class occur in spring, when the transit of the central condition to the north is delayed, and the volume of the upper trade remains concentrated upon the Southeastern States. Such drouths are the most common in the early part of the decade, following open winters, and are greatly injurious to crops of hay and winter grain. Such a drouth occurred in the spring of 1862, and it was very dry in all the Northern States, while McClellan and his army were nearly drowned on the Chickahominy.

"This class of drouths is most common in the Northeastern States, because the focal path does not move up there as early as it does to the westward of the mountains, and often seems rather to contract down in March and April.

"Another class of drouths is produced by an unusually extended transit and concentration of the central condition to the north and west in summer, carrying the path of the conditions farther to the west and north, and leaving the southeastern portion of the United States comparatively dry. Such was the drouth of 1854.

"That, too, occurred in an early year of the decade, and was connected with an excessive transit of the central condition.

"The third class of drouths is meridional, depending upon a concentration of the volume of counter trade, and a succession of storms issuing out of the central belt, and passing up on the eastern coast of the United States. Such a condition of things existed in 1867, when a severe drouth covered the interior States from Texas to Canada, and the Atlantic States were drenched by a succession of tropical storms which passed up the coast, reaching inland a few hundred miles.

"A fourth class of drouths which sometimes extends as far north as New England, is confined mainly to the Atlantic coast. These are accompanied by a dry northeast wind, and are evidently produced by an unusual and temporary extension of the outer limit of the northeast trade, as high up as 41° or 42° off the Atlantic coast. I have known such a temporary extension, with its easterly wind, to last seventeen or eighteen days. But the few others that I have known have ranged from a week to ten days. The heavens are never more brassy than during the short drouths dependent on this cause.

"There are also limited drouths dependent upon local causes.

"There is a known tendency to drouths in the summer season in the Gulf States, upon an area which for the time being is left uncovered by the upper trade, in consequence of its extension to the north and west in midsummer. The drouth of 1854 commenced upon that area, and extended north and west. The line between this local drouth and the northern line of the central belt which extends up on to

Florida and the Gulf Coast in midsummer, is sometimes very sharply defined. Thus, at New Orleans, Tampa Bay, Mobile, Fort Brook, St. Augustine and Savannah, the rainfall may be heavy, when upon an east and west line, one hundred miles to the north of them, a severe drouth may prevail. This drouth, although apparently local, depends upon a degree of the same action of the central condition as that which produced the drouth of 1854.

"There is a local tendency to drouths upon the southern coast of New England, and the fall of rain is materially less in the summer than upon the more elevated ridges to the north of it. This is so well recognized a fact as to be represented upon all the hyetal charts of the country.

"It is painful to hear people in New England complain of the apparently excessive rainfall of the rainy season in May and June, when there is a certainty that the springs and wells will need it all in July and August.

"Other local drouths seem to depend upon the manner in which belts of showers distribute their rain. The Eastern and Middle States of the Union are supplied with rain in summer, in normal seasons, mainly by passing belts of showers. These belts are very irregular in their action. Sometimes they precipitate heavily in the afternoon and early part of the night only, and then the area over which they pass during the latter part of the night and morning will receive little or no rain from them. Thus the condition of August, 1859, deposited about one and one half inches of rain at Buffalo and Rochester in the afternoon and night of the 3d, and nearly three inches at Amherst, Mass., in the afternoon and night of the 4th, but it deposited very little rain at many of the intermediate places where the focus was vertical in the forenoon. Harvard received a trifle more than one inch, and Providence three fourths of an inch.

"These differences show that the fall is heaviest from belts where their focus is vertical in the latter part of the afternoon and in the evening, and inconsiderable where it is vertical during the early part of the day. In this there is conformity to the manner in which rain falls, under the great central belt of the tropics. Configuration also has an influence. The elevations of the interior of New England receive a larger rainfall in summer than the depressed and more level coast.

"Hills and mountains increase the intensity and precipitation of the cloud belts as they pass over them, and that precipitation is still further increased by the surface atmosphere and scud, which are drawn to them by the increased intensity, especially if that surface atmosphere is drawn from an extensive moist evaporating surface.

"The materials and data for a comprehensive and thorough examination of the drouths of this country do not exist. The records of the weather prior to this century are too few and imperfect, and confined to a few localities. The same is measurably true of the first three decades of this century. The records since accumulated at the Smithsonian Institute and the War Department, if continued,

will furnish the next generation ample data for their elucidation, and that may throw very much additional light upon the whole subject.

"Mr. Charles L. Flint, Secretary of the Board of Agriculture in Massachusetts, instigated by the extraordinary drouth of 1854, sought out all the old records which could be found, and embodied the result of his examination in his report for the year 1854. About fifty severe drouths are noticed, commencing with the year 1623, and extending to 1854. Of these nearly two thirds were summer drouths, occurring between the middle of June and the 1st of September, ending usually with heavy rains in the latter part of August, and apparently owing, like that of 1854, to a concentration of the conditions on the focal path, to the west and north. Nearly one third were spring drouths, apparently due to the detention of the focal path at the south, on the Atlantic coast, and its undue extension to the northwest.

"A few continued through the whole season, and were probably due to a meridional diversion of the upper trade, like that which occasioned the interior drouth of 1867. The remaining ones were for shorter periods and obviously local.

SUN-SPOTS.

"Whatever the nature of the motive-force or its manner of operation may be, it is certain that it emanates from the sun. The semiannual transits of the whole system from south to north and from north to south, following the sun in its transits from tropic to tropic, as well as the time of the diurnal changes, showing in a lesser degree, but with equal certainty, its influence, all point unerringly to that great luminary as the controlling source of the power. Irregularities in the operation of the system must of course be referred to irregular action of the power which controls it, as affected or modified by other influences. Our knowledge of the sun is yet imperfect. We feel and know its *heating* power; we know that we are mainly dependent upon it for *light*, and we can detect and trace its *magnetic* influence. We know that its surface is not uniformly the same; that it is sometimes partially obscured by dark spots, and at other times its surface is mottled by dark dots or pores. The former occur in cycles, and increase and decrease with substantial regularity, and their connection with the irregularities in the operation of the atmospheric system is clearly traceable. This part of our subject has great significance, in respect to the laws of the system, as well as to the elements of prognostication.

"'When the sun is examined through a telescope, its surface is found to be marked by black spots, edged with a penumbral fringe of uniform shade; they appear sometimes singly, sometimes in groups. These spots are not permanent, but undergo changes from day to day, or even from hour to hour, indicating a form of gaseous matter. They seldom last longer than six weeks, and often only a few hours. They are seen to break out and enlarge, or to contract and disappear, and occasionally

one is observed to divide into several. When they disappear, the black centre always vanishes before the penumbra.

"'Their size is sometimes enormous. Meyer records having seen one, in 1758, whose diameter was one twentieth that of the sun, and Secchi thinks some of them are deeper than the earth's radius.

"'They are almost entirely confined to a belt of 25° on either side of the sun's equator.

"'They are found to gradually increase in number up to a certain period, and then to decrease to a certain period, and so on. The cycle is completed, according to this investigation, in ten years.' *

"The table of Schwabe shows that there is, in relation to the number and size of the spots, in different decades, as for example: the table commences with the year 1826, when the number of spots were but 118.

"In 1836 the number was 272, and in 1846 it was but 157. Again, the greatest number of spots during the decade from 1820 to 1830 was in 1828, but the greatest number for the decade from 1830 to 1840 occurred in 1837, which was 333, and again in the decade between 1840 and 1850, in 1848 the number was 333.

"The spots were not as numerous from 1820 to 1830 as during subsequent decades. That was a very warm decade. It was consequently a period when epidemics were prevalent, and the cholera spread from India all over the northern hemisphere, arriving in this country in 1832. In the solar decade from 1833 to 1843 the spots were more numerous, and the season correspondingly cold and peculiar in both hemispheres. In every decade the year preceding or succeeding the minimum of spots is colder than that in which the minimum occurs.

VOLCANIC ACTION.

"That volcanic action affects the weather locally is generally believed. Even earthquakes at a distance from volcanoes seem to exert an influence.

"Hittell, on the 'Resources of California,' says: 'Earthquakes, according to the common theory of Californians, are electrical in origin, or closely connected with electrical influences. Many of the strongest shocks have been preceded by a condition of the atmosphere very similar to that which precedes thunder-storms in other lands.

"'When the weather is sultry and oppressive, people say: "Look out for an earthquake!" And it usually comes, perhaps so faint as to be barely perceptible, and sometimes not till several hours after a change in the weather.'

"According to Mr. Dobson:

"'1. The eruption of submarine volcanoes has produced water-spouts.

"'2. Hurricanes, whirlwinds, and hailstones accompany the paroxysms of volcanoes.

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* New American Cyclopædia.

"'3. In volcanic regions, earthquakes and hurricanes often occur simultaneously, but in no certain order, and without any volcanic eruption being observed.

"'4. The breaking of water-spouts on mountains sometimes accompanies hurricanes.

"'5. The fall of an avalanche sometimes produces a hurricane.

"'6. Water-spouts occur frequently near active volcanoes.

"'7. Cyclones begin in the immediate neighborhood of active volcanoes.

"'8. Within the tropics, cyclones move toward the west; and in middle latitudes, cyclones and water-spouts move toward the northeast in the northern hemisphere, and toward the southeast in the southern hemisphere.'

PROGNOSTICATION.

"How far and by what means can a local isolated observer prognosticate the weather?

"1. The normal state of the polar zones is still, fair weather.

"2. The changes from that *state* result from the influence of forming approaching or passing CONDITIONS. In respect to prognostication, the inquiry must be, how long will that normal state continue undisturbed by a passing condition, or when will the next condition approach and disturb that state by its changes?

"What will be the character and intensity of that condition and its incident changes? How long will it be in passing away and permitting the normal *state* to return?

"Certainty or regularity in relation to the intervals between the occurrence of the conditions is not ordinarily to be expected. The Californian knows indeed when the focal path of the conditions has moved to the north in summer, that it will not descend until fall, and that a long period of drouth and fair weather is before him. He sees the thin and feeble southern edge of the conditions occasionally pass over him, while their intense and precipitating bodies are far to the north, carried by a law as unchangeable as the transits of the sun.

"But with respect to the eastern part of the continent, that class of drouths is exceptional. So, too, in the rainy season of spring and early summer, when the conditions are focal over us, and both frequent and intense, and we say, 'It rains very easy now,' and it does so almost every day, and the intervals are short, we can calculate with reasonable certainty on the recurrence of rain. But this also is confined to a season of a few weeks, and is exceptional.

"Nor is there any certainty in respect to the character or intensity of the next condition on which a local observer can rely. There is *probability*, dependent upon the season of the year and the location of the year in the decade, but it is merely probability.

"Inasmuch, then, as there is no certainty or regularity of interval between the

conditions, or in respect to the character or intensity of the one which will next pass over the observer, it is philosophically and logically obvious that his *only* reliance is, and must be, upon the observable *changes of state* which the forming, approaching or passing conditions induce; and as matter of fact, it will be found, on careful examination, that all the most important proverbs and signs which men have observed or adopted and tradition has preserved are founded on those changes of state; and that all which are not directly *connected with* or *indicative of some one of those states* are empirical and worthless.

"1. The first element to be considered is the *location* of the observer.

"2. The second preliminary element is the season of the year. This element is closely connected with the preceding, and both are connected with the question, where, at the time of observation, is the focal path of the system of conditions under which the observer is situated? Is that focal path *over* him, or *south*, or *north*, or *east*, or *west* of him, and how far? And what are the probabilities that a condition pursuing the path will spread out so as to cover his locality at that season of the year?

"3. The third preliminary element is, what year it is in the decade, and what the state of the sun's surface in relation to spots.

"The presence or absence of spots upon the sun has an effect in carrying the focal paths of the conditions to the south in winter, and extending them north in summer, or contracting them at both extremities, and affecting the rapidity of their transit in the different portions of the decade, and in different decades.

THE SEVEN STATES.

"There are seven states to which we are to look to determine the immediate future.

"1. The *weight* of the atmosphere.

"2. The *temperature*.

"3. The *winds*.

"4. The *clearness* or *cloudiness* of the atmosphere.

"5. The *humidity*.

"6. The *precipitation*, rain, hail, snow.

"7. The *electrical* state.

"The air has weight, and though exceedingly thin and mobile, is controlled by the attraction of gravitation and unaffected by the revolutions of the earth.

"The weight of the atmosphere is measured in two ways—by the barometer, and the temperature at which water will boil at the time and place. The latter is rarely used.

"The mercurial barometer is the principal instrument, and the most certain and reliable.

"The barometer at one season of the year, and in one class of conditions, is elevated by the first effect of that influence, and in respect to that class, elevation and not depression is the indication of its approach and the measure of its intensity; and, again, it has no invariable fair-weather standard, a departure from which, by elevation or depression, will indicate with certainty the character and intensity of the approaching condition.

"The mean height of the barometer is stated to be, for the United States, thirty inches at the sea-level. This is substantially accurate when taken for long periods and for all latitudes, but there is very considerable diversity in different localities. The mean from the northern limits of the trades in the northern hemisphere is higher than in the trades, differing greatly in different places, from several causes, the principal of which is the difference in the volume of the equatorial current, or upper trade, which passes over the locality.

"The mean of thirty inches is the average of *all fair-weather elevations* and *foul-weather depressions*, and as the foul-weather depressions are greater in extent than the fair-weather elevations, and the latter differ very greatly in different climates in the same latitude, according to their intensity, it is obvious that thirty inches is not a reliable fair-weather standard for any particular place. The greatest known fluctuations of the barometer were three and a half inches, and of that range at least two thirds was below the mean of thirty. The barometer very rarely rises above thirty-one in this country, and sometimes falls as low as twenty-eight, making a range of three inches, and it would be safe to say that the ranges, as a rule, are twice as great below thirty as above it. And there are other difficulties. The ranges and the mean elevation of the barometer vary in different years, in different months of the same year, and in different localities. The reader must endeavor to get the true fair-weather standard of his locality.

"In all latitudes the mean height is low when the passing conditions are intense and frequent, and that is the main reason why it is so low at Cape Horn. For the same reason mainly the mean height of the barometer is lower in Europe than here.

"They have more frequent though less intense conditions, and the changes in the barometer more frequent, but the ranges less. At the same time their volume of upper trade is also less. In this country it ranges lower, under the focal path of the conditions, and during the rainy season, than upon either side of it.

"The barometer ranges lowest when the focal path of the conditions is over us in its ascent to the north, in the spring and early summer.

"The barometer ranges highest on the north and south of the focal path of the conditions, and in the winter and autumn.

"The approach of northeasters is told by a rise of the barometer. It is common in the Eastern States for it to rise from four tenths to six tenths above thirty at sea level when a northeast snow-storm is approaching, and still higher before a thaw.

"When the barometer feels the influence of the approaching condition of a summer belt of showers, it commences falling steadily, and falls rapidly or slowly in proportion to the intensity of the condition and the rapidity of its approach; rising again slowly after the condition is past. This is true in respect to conditions which approach overland from the west. It does sometimes rise on the approach of an intense hurricane condition up the coast, and afterward fall rapidly and very considerably at those places which are covered by the condition.

"Specific rules for observation cannot be given, but in reference to a fair-weather standard I will say:

"1. Your mean fair-weather elevation of the barometer will range between thirty and thirty and two tenth inches, deducting therefrom one tenth of an inch for every one hundred feet, or to be perfectly accurate, every ninety-one and seven tenths feet of altitude above the sea-level.

"2. That the fair-weather elevation will average higher in winter when the focal path is south of the observer, *in normal years*, than in midsummer, when it is at the north of him.

"It will average lowest when the focal path is over him in spring and early summer.

"3. A fair-weather point cannot be fixed for either period, except approximately. If I should attempt to fix them, I should say, thirty and two tenths for the period when the focal path is *farthest south*, if not unusually concentrated, thirty and one tenth when it is *farthest north*, and thirty when *centrally focal*, *deducting*, as in rule first, for altitude, and scaling gradually from one to the other, as the focal path changes its position. But it must be borne in mind that a great contraction and concentration of the upper or counter trade, down upon the Southeastern States, will produce great cold and a low fair-weather barometer west and north of them in very severe winters.

TEMPERATURE.

"Temperature is important in connection with the other elements, as an indication of the approach of a condition, and important also as furnishing an indication of its character and continuance, but still more important to be considered in relation to its changes, when the condition is passing away.

"In winter, when the normal state of the weather is clear and cold, among the other early indications of the approach of a stormy condition is an increase of temperature. As an indication of the approach of a winter storm which is invariably present, and nearly simultaneous with the rise of the barometer and the appearance of cirrus condensation, it should always be looked for and regarded.

"When the season advances, and the mean daily temperature is above 65°, an elevation of the thermometer is not to be expected upon the approach of a *northeaster*. In the hottest seasons of the year the temperature never exceeds 70°

during a northeast storm. When it ranges above that in the daytime, but on a given day fails to rise higher, or, having risen, falls to that point or below, it is as certain an indication of the character of the approaching condition as the precedent sudden and considerable rise of the barometer.

"During the rainy season changes of temperature, though less distinctly marked, are worthy of note as indications. The prevalent winds, if they occur in spring or early summer, are easterly, and their *chilliness* proverbial.

"In relation to the approach of a belt of showers, temperature is an important indication. It always rises high, *and above the mean of the season*, on the southeasterly side of those belts; it is therefore a distinguishing characteristic, as well of their approach as their intensity. The 'hot spells,' or 'heated terms,' are an elemental part of the condition, and *the excessive heat is created by the cause which organizes and continues the condition.* Very hot weather sometimes occurs in midsummer, during drouths, which is not connected with or a part of an approaching condition, but is the mere effect of an unclouded sun operating upon a dry and heated soil. Two characteristics, however, distinguish the incident heat of the condition from the mere heat created by the sun. First, the latter does not rise so high, and it cools off by radiation at night, rarely rising to 90° in the daytime east of the Rocky Mountains, unless there has been a *long-continued drouth*, and cooling off during the night to 70° or below. Second, the incident heat of an approaching condition is both humid and electric, a state which is described as sultry, muggy, close, and the temperature continues high through the night and into the morning when the condition is to arrive. The humid, electric, muggy heat of an approaching condition of an intense belt of showers would be scarcely endurable if it was not tempered by the accompanying incident of southerly wind.

"Temperature is also an important element in relation to the character which the storm will assume. In the middle latitudes of the country it is usually an interesting inquiry whether a coming winter storm will be one of rain or snow, and one of the elements in the answer is temperature. Snow sometimes falls from the northwest scud in squalls, for a few moments or even half an hour, early in the spring or late in the fall, when the thermometer is considerably above the freezing-point. Snow sometimes also falls in the early part of storms after the thermometer has risen above the freezing-point, but unless the thermometer falls again soon the snow will turn to rain, for snow does not often fall for any great length of time with the thermometer above the freezing-point, and when it does it is usually in large flakes, which indicate that it is about to turn to rain. Snow sometimes falls with the thermometer near zero, but such instances are rare. In a snow-storm in the Arctic regions, described by Dr. Kane, the thermometer rose to near zero. When a snow-storm is approaching in the middle latitudes of this country, if the thermometer is near zero the temperature generally rises about twenty degrees before

the snow falls. The temperature in snow-storms, between the latitudes thirty-five and fifty-five, is from 20° to 30°, between latitudes forty-two and forty-one from 24° to 30° from the commencement to the close of a storm.

"Rain sometimes falls when the thermometer is low, freezing to the trees, and constituting what is called an *ice-storm*; but there, again, the fall of the rain is not caused by the continued low temperature, but by a warm southerly current in the upper part of the surface story, the storm being exceptional, and having its focus to the north.

"Very warm southeasters sometimes occur, even in severe winters, and one or two may be expected in ordinary winters, for 'January thaws' are proverbial. They are usually southeasters, caused by a very large, concentrated, and exceptional eruption of the counter or upper trade west and north of the focal path, having a warm area on their eastern front corresponding to the hot area which they present on the same front in summer.

"The thermometer may be watched during the existence of storms with reference to their continuance. In a northeast storm in spring or at other seasons, when the focus of the storm is to the southeast of the observer, if the thermometer falls and the wind backs into the north the rain is usually at an end. The wind will continue to back to northwest, and it will soon after light up in that quarter, and fair weather return as the storm passes away to the eastward. If, however, it veers back to the northeast, it will continue. In those northeasters where the focus is over the observer, or to the north of him, the cessation of the rain is usually accompanied by a rise in the thermometer and a temporary lull in the wind, followed by the wind afterward coming out from the west and hauling slowly into the northwest. A similar lull sometimes occurs in southeasters with a fall in the thermometer. The rain is then over. If the wind has been very heavy from the southeast this lull will be followed by a sudden change to the northwest. This is most common in the intense hurricane storms which come up the coast. In a majority of the southeasters the wind hauls gradually round through the southwest and west to the northwest, the thermometer gradually rising.

"A very sudden change in the thermometer is frequently experienced when a belt of showers is passing over us, with or without a change of wind to northward. The southerly wind usually lulls before the precipitating body of the cloud reaches us, and in many, though not perhaps in the majority of instances, there is a heavy gust from the westward preceding the fall of rain and continuing during that fall. Such gusts are often accompanied by a marked fall in temperature.

"All the conditions which have a southerly wind and a warm or hot area on their easterly or southeasterly sides have northerly winds and a cool or cold area on their westerly or northerly sides. Changes in the thermometer in a few hours are sometimes very great. It is impossible to describe in adequate terms the importance

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HOLLY GROVE HERD.

JOHN I. HOLLY, PLAINFIELD, NEW JERSEY.

of understanding and heeding this fact, for it is thus that the sudden changes from heat to cold are produced. Let it be understood that the frame which is now sweltering in a humid atmosphere of 90° on the hot side of a condition will, as a matter of course, and by the operation of perfectly intelligible and unalterable laws, in a few hours be exposed to the chilling temperature of 60° under the cold side of it, and the additional chill occasioned by a rapid evaporation in its peculiar dry air. And let it be understood that it is by such changes, so occurring, and so capable of being forecasted, but which are *unregarded*, that many diseases which bring suffering and death are produced.

FROST.

" It is after one of these belts has passed, and after its northerly wind has blown for one or two days, that we have our unseasonable frosts. That is the time to look out for them in August and September.

" In a majority of cases the dreaded 'first frost' does not occur early in September, unless the northerly wind continues two days; but it does sometimes come in the first night after the clearing off. Frost makes at the surface of the ground as soon as my thermometer, hanging five feet from the ground, falls below 40°, and if the thermometer is at or below 50° at sundown frost is very probable, when the night is clear and still. After the wind has blown from the northward through the day the thermometer falls rapidly after nightfall.

" Wind or cloudiness prevents frost, but both may disappear before morning and frost ensue.

THE WINDS.

" The conditions themselves are characterized as *Northeasters*, *Southeasters*, *Southwesters* and *Northwesters;* and that the southerly winds, according to their freshness and earnestness, are reliable indications of the approach and intensity of the showery conditions, we have more than once had occasion to observe. *Breezes* are often *local*, but there are no *fresh*, *earnest winds*, unless *created* by the *influence* of some approaching or passing *condition*, and the quarter from which they blow, and their force, are consequently among the most reliable indications we have. Ordinarily, the wind and its direction and force are felt or indicated by the wind-vane; but it is often observable before it is felt at the surface by its scud, or by sounds. The roar of the surf or breaking of the waves on the shore, when great bodies of water are disturbed by a precedent storm-wind, is often heard before the wind is perceived on the land. Various sounds are heard with great distinctness before storms, according to the character of the coming winds. This is undoubtedly moving in a rapid invisible current, not far above us. If from the east or south it betokens rain, if from the western quarter fair weather.

CLOUDS.

"In the clouds of a condition, when they come in sight, we have actual, visible evidence of its approach and character. The first cloud seen is ordinarily the cirrus, which overlies the condition, and which is not only first visible because the most elevated, but because it extends in every direction farther than the other strata of a storm.

"All the forms of cirrus are seen in the advance condensation of the conditions, except the cumulo-cirrus, or fleecy cloud, which occurs independently in set fair weather.

"But the early cirrus condensation of the conditions is not always visible. There may be enough of it to affect the brightness of the sun, or the moon and stars, or to occasion halos when it is not sufficiently dense to assume the appearance of clouds. It is a turbid or misty condensation rather than visible cloud. Sometimes it is of a smoky character, like that which attends midsummer drouths, or the shorter dry spells of autumn or Indian summer, and gives the sun a blood-red appearance. But ordinarily, when it constitutes the advance condensation of an approaching condition, it changes the appearance of the sky from a deep azure to that 'lighter hue' which Humboldt describes as preceding the arrival of the central belt of rains from the south. It was found by Gay Lussac, and has been by other aeronauts to have the form of cloud at the height of from twenty thousand to thirty thousand feet, when not visible at the earth except as obscuring mistiness.

"Thin cirrus cloud, whether misty, linear or fibrous, pales the light of the sun, especially at nightfall. Occasionally in the course of the day, when the cirrus is dense, various coronæ and halos appear in it. The halos of the moon only are of importance. There is at all times a circle round the moon, more or less distinct, produced by the mistiness of the atmosphere, but during normal fair weather the circle is small and not very distinct. But when the circle is large, perfect, and the rim well defined, it is a certain sign that the cirrus in which it is formed is the advance or lateral condensation of a storm. It is best seen when the moon is nearly vertical.

RÉSUMÉ.

"In winter and early spring, when the focal path is at the south, we look at the southwest for the first appearance of the clouds of the condition.

"They may be looked for at all hours of the day, but if they exist at all will be seen most distinctly at nightfall. Later, in the spring and early summer, when the focal path has moved to the north, you will look to the west, and in summer and early autumn, when the focal path is north of us, you may look north of west, unless you reside in the Atlantic or New England States, and have reason to look for an approaching hurricane condition, which is coming up the coast, and then you will look south-southwest. The appearance may be that of the misty cirrus which we

have described, discoverable by the aid of the sun, moon or stars; or the cirrus existing in visible, thready patches or wisps; or some form of the cirro-stratus; to be followed by the cumulo-stratus or thunder-head, or the rain-bearing stratus, according to the season of the year and the character of the condition.

"Sometimes, though not often, the scud may be seen floating in the southerly or easterly wind, before other cloud condensation is visible, except the misty, formless cirrus. Generally, however, the scud are not seen before the cirrus assumes form and patches of cirro-stratus appear.

"When in midsummer a belt of showers is approaching from the northwest and the cloud condensation does not show itself above the horizon before nightfall, you may sometimes discover it in the evening or night, as it is illumined by the flashes of lightning which play on its summits. And before the thunder-heads appear above the horizon the flashes of lightning will perhaps be seen, reflected from the milky stratum of cirrus, which will cover that part of the sky, and seeming to come from the atmosphere above the horizon.

HUMIDITY.

"The atmosphere contains at all times a quantity of watery vapor; whether combined or uncombined with the air or its oxygen has been and is still a question.

"Certain it is that at times there exists a quantity which is uncombined and visible, and equally certain it is at other times, when evaporation has been large, a considerable quantity must be contained in the atmosphere, which, if it is not combined, is at least invisible, and undiscoverable by any ordinary test. The subject of evaporation is receiving closer attention than formerly. Mr. Steinmetz has invented a *vaporimeter*, to measure evaporation, an excellent instrument.

"Evaporation is exceedingly rapid in our northwest winds. The excess of evaporation falls in dew.

"Two very important facts are stated by Steinmetz: First, 'That invariably the greater the evaporation the less the rain, and *vice versa*, in every month, on all occasions.' Second, 'That evaporation decreases during the hot, sultry period which precedes a thunder-storm.' The importance of these two facts will be seen in connection with another—that humidity, as measured by the hygrometer and perceived by our senses, commences to increase with the first influence of an approaching condition, and continues to increase till the arrival of the rain. Mr. Steinmetz believes the hygrometer the most reliable instrument in the prognostication of the weather.

"But the hygrometer cannot tell us directly, at any given time, whether the upper trade is saturated or not, for it is flowing in a distinct and isolated stratum far above the earth. I believe in the hygrometer, not because it indicates the state of

saturation merely, or indicates a fall of rain consequent on the mere saturation of the surface story, but because it indicates the *influence* of an *organized* atmospheric *condition*, which influence *produces* a humid state of the atmosphere. The mercurial hygrometer with the moistened bulb is now generally used.

"The point at which the mercury is depressed by evaporation is called the *dew-point*. The *difference* between that and the dry thermometer is the *complement* of the dew-point, and the existing humidity is measured by that difference. The *greater* the humidity the *less* that difference.

"There is another observable evidence of humidity indicative of an approaching condition, especially of a belt of showers in summer and a southeaster in winter—such as the deposition of moisture upon tumblers and other vessels containing water, and upon flagging and other stones connected with the ground.

SNOW, RAIN, HAIL.

"Before a snow-storm the advance cirrus condensation is generally of the linear kind, existing in long threads or bars, extending from southwest to northeast, and not in wisps or patches, as in summer. The layer of stratus from which the snow is to fall is smooth and uniform, and of a lightish hue. There is at the approach and in the commencement of the storm very little wind, and that at first southwest, and afterward northeast. The barometer usually rises higher before a snow-storm, and falls with less rapidity. Of rain and hail former chapters may suffice.

THE ELECTRIC STATE.

"Our knowledge of electricity is not yet such as to furnish alone direct evidence of the approach of a condition, but there are many signs which are founded on the indirect effect of electricity, and are relied upon, even in less intense climates than ours. A collection of nearly all the received and credited English signs was made by Dr. Jenner, and arranged in rhymes. Nearly all of any merit depend upon electricity.

JENNER'S SIGNS OF RAIN.

"'The *hollow* winds begin to blow,
The clouds look *black*, the glass is *low*,
The soot falls down, the spaniels sleep,
And spiders from their cobwebs creep.
Last night the sun went pale to bed,
The moon in halos hid her head.
The boding shepherd heaves a sigh,
For see ! a rainbow spans the sky.
The walls are damp ; the ditches smell ;
Closed is the pink-eyed pimpernel.
Hark ! how the chairs and tables crack.
Old Betty's joints are on the rack.

Loud quack the ducks, the peacocks cry ;
The distant hills are looking nigh.
How restless are the snorting swine !
The busy flies disturb the kine.
Low o'er the grass the swallow wings ;
The cricket, too, how loud it sings !
Puss, on the hearth, with velvet paws
Sits smoothing o'er her whiskered jaws.
Through the clear stream the fishes rise
And nimbly catch the incautious flies ;
The sheep were seen at early light
Cropping the meads with eager bite.
Though *June* the air is cold and chill ;
The mellow blackbird's voice is still.
The glow-worms, numerous and bright,
Illumed the dewy dell last night ;
At dusk the squalid toad was seen
Hopping, crawling o'er the green.
The frog has lost his yellow vest,
And in a dingy suit is dressed.
The leech, disturbed, is newly risen
Quite to the summit of his prison ;
The whirling wind the dust obeys
And in the rapid eddy plays.
My dog, so altered is his taste,
Quits mutton bones on grass to feast ;
And see yon rooks, how odd their flight—
They imitate the gliding kite,
Or seem precipitate to fall,
As if they felt the piercing ball.
'Twill surely rain. I see, with sorrow,
Our jaunt must be put off to-morrow.

" Most of the signs relate to the feelings of animals. They cannot be supposed to have any mental conception of an approaching storm. Man and animals and plants are all sensitive to and exhibit signs of electrical action before storms.

" Hone added the lines—

' Her corns with shooting pains torment her
And to her bed untimely send her.'

" Howe added another couplet—

' The smoke from chimneys right ascends,
Then spreading back to earth it bends.'

" I know of no cause to which this descent of smoke can be attributed except that it is positively electrified and attracted by the negatively electrified earth.

"No degree of humidity, with the thermometer at 70°, can account for the oppressiveness of what is called a muggy, close atmosphere. No degree of humidity, with the thermometer at 65°—its common spring and autumn register in northeasters—could revive the rheumatism in old Betty's joints or the pain in her corns.

"The renewal of pain in once broken bones or old scars is felt in the dry, warm air of the house and in bed.

"The down of the dandelion and other plants closes for bad weather, but expands for sunshine.

"The trefoil grows more upright, with a swelling stalk, against rainy weather. Before showers the trefoil contracts its leaves, as does the convolvulus and many other plants.

"The pimpernel (*Anagallis*) closes its petals on the approach of rainy weather.

"Chickweed (*Stellaria*) in showery weather is half-shut; when it is entirely shut we may expect a rainy day.

"If the flowers of the Siberian sow-thistle remain open all night we may expect rain next day.

"There are many traditional signs which have no value whatever. Thus, it is common to look for storms at the equinoxes, or when, as the sailors say, 'the sun crosses the line.' This is an absurdity. Storms of *like character* are occurring *every day in the year*, in different and numerous portions of the hemisphere. In some portions of the hemisphere storms *never* occur. In neither respect is there any difference on that day.

RÉSUMÉ.

"ALL SIGNS ARE FALLACIES UNLESS CONNECTED WITH OR FOUNDED UPON ONE OF THE SEVEN STATES OF THE WEATHER.

"When we hear of an existing and distant storm we can tell, within a day, when, if it originated east of the Windward Islands, or over the Caribbean Sea, or the Gulf of Mexico, or Texas, it will pass over any particular point in its path, for we know substantially what its movement per hour, according to its intensity, will be, and what its course will be at that season of the year.

"I believe that by the next generation the West India Islands will all be connected by wire, and that important *representative* points of observation in this country will be connected in like manner, and the organization and progress of the conditions be reported to the country from hour to hour. The advantages of such a system, to all our industries, will be beyond present comprehension.

DURATION OF CONDITIONS.

"Scud in the southerly wind, running toward the approaching belt of condensation, if very numerous and large, *and ragged at the edges*, and moving rapidly, a heavy fall of rain may be anticipated *at the point to which they are*

running. Freshets follow where these scud are running, and may be predicted without failure.

"The strength and freshness of the wind which blows toward the focus of the storm, and the number and character of the scud, are all indicative of its strength.

"How long will a condition continue?

"Very weak belts of showers in summer may not be more than twenty miles wide, and pass over in two hours. There is great variety in the width of the belts of showers. We have no means of judging of that width with certainty except by the telegraph. The character and continuance of the southerly wind, and its scud, the continuance of humidity, and our feelings, will give a partial knowledge. Some belts of showers last twenty-four hours. The average length of time during which rain falls in southeasters is about fifteen hours.

"It remains cloudy for a much longer period.

"The northeaster is of longer continuance than any of the other distinct conditions. It is rarely less than forty-eight hours from the time when the first cirrus condensation is visible and its wind begins to blow, to the time when its wind and rain cease. It is frequently twice as long, and sometimes longer still.

"I have seen the scud run continuously and at the same elevation for more than sixty hours.

"The wind not infrequently blows forty-eight hours toward an approaching northeaster before its precipitating portion reaches us.

ORGANIZATION OF THE ATMOSPHERIC SYSTEM.

"The organization and motive force of the atmospheric system is invisible. We recognize its existence only in its effects. We see that each organization has its law, and that the whole is governed by a controlling agency; we see, too, that this agent has IMMENSE POWER; that it is capable of moving the atmosphere or exerting a force equivalent to moving it, at the rate of six hundred aud eighty-two miles per hour.

"What is that force? That it emanates from or is excited by the sun we cannot doubt. We know of one, and but one force capable of exerting such a controlling and immense force, and that is electricity.

PROPOSITIONS.

"1. 'The earth is a magnet, but not a natural magnet,' a magnet by thermal electricity.

"2. According to the law of thermo-electricity, currents must be excited at the place where the earth is being heated, and flow to the west, toward the portion of the earth which is coolest. The electric currents thus excited flow around to the west, where it is night, and thus form a permanent succession of currents flowing around the earth from east to west, as it presents its surface to the action of the

sun during its daily revolution. By a central belt of currents encircling the earth within the tropics thus excited and operating the earth is constituted a magnet. (This is a theory of Ampère.)

"3. Parallel currents of electricity have a tendency to converge toward each other. Doubtless the primary central currents flowing to the west exist under the entire central condition, converging toward the centre, where the currents are most intense, and where the great central belt of rains is found.

"4. As the sun in its transits is more vertical, and acts with greater heating power on the *summer side* of the central belt, the currents gradually become more intense upon that side and less intense on the other, and thus the central condition with its belt of rains follows the sun in its transits, because the sun is continually creating a new focus of intense currents. And for the same reason the central condition continues to move north or south after the sun has reversed his transit, and until it has heated up the waters on the reverse side.

"5. All successive currents of electricity induce secondary currents on each side of the primary one, and they flow in an opposite direction to and parallel with the primary current. Such currents are produced on either side of the central condition and in the temperate and polar zones, which gives to the atmosphere and all conditions contained in it a tendency or drift to the eastward.

"6. A second secondary current is sometimes induced by the first secondary, and that too moves parallel with and opposite to the direction of its inducing current.

"7. By this method of magnetization there is also produced in or over the earth a class of lateral currents like those discoverable in all magnets by the aid of iron filings.

"8. The magnetic currents or currents of electricity which flow outwardly from the earth are recognized by us in various ways. Faraday intercepted them by a revolving wire, which by its revolutions cut them, and obtained from the end of the wire currents of electricity of low intensity but considerable volume. The flow of these currents is variable in quantity, and when the quantity is excessive the Aurora is produced by them in the upper, attenuated atmosphere. Sometimes when the quantity is very excessive, constituting what Humboldt calls magnetic storms, they produce an Aurora in all parts of the atmosphere, and the telegraph wires can be worked by them without a battery. Magnetism consists of, or has associated with it, currents of electricity, and all electric currents are lines of force, as Faraday has abundantly demonstrated.

"9. All currents of electricity passing through the atmosphere tend to displace it or to create currents in it. Thus we attribute thunder to the recoil of the air into the vacuum which the current of electricity has occasioned by carrying the air within its passage downward through the atmosphere. In substantially the same manner it carries the air upward in a tornado. These magneto-electric currents are constantly

being discharged from trees and mountains, and every object connected with the earth. They have much to do with animal and vegetable life.

"10. These lateral currents have much to do in constituting the great, permanent, general movements of the atmosphere; with the trade-winds while surface trades, and when constituting the upper trade or equatorial current. But most of the local and special winds are the result of static induction and attraction.

"11. Evaporation is an electric process, aided by heat, but existing independently of it, for ice and snow evaporate in the Arctic regions and everywhere, and at all experienced temperatures. The vapor when evaporated is combined with electricity and oxygen, and exists by force of that combination in the atmosphere; and the disturbance of the electricity and the combination, by static induction or other action, occasions the condensation of vapor, the formation of vesicles, and the constitution of a cloud, and the diffusion of the electricity thus set free over the surface of the vesicles.

"12. The trade-winds are probably produced primarily by the lateral magneto-electric currents of the earth. Upon islands which lie near the outer limits of the northern trade in summer the surface and upper trade constitute distinct strata of a different character.

"When the surface trade is of sufficient volume to cover the elevation of the islands they have unbroken drouth. As the surface trade recedes in the fall, and the upper trade comes in contact with the elevations, rain falls upon and to the leeward of them, and the line of rain descends the slopes as the surface trade decreases in depth.

"These facts indicate the initiation of the surface trade by the permanent magneto-electric currents. As the surface trades pass on beneath the stratum of cirrus condensation which overlies them they are affected statically, and storms and showers and squalls are produced in them. So the belt of rains is constituted.

"As they pass on beyond the belt of condensation, if they are in moderate volume they become clear again, and pass as upper or counter-trades into the opposite hemisphere, but partially deprived of their vapor. Arrived in that hemisphere, they are exposed to the static electric induction of the positive atmosphere of the upper story, and the negative electric induction of the earth. Storms or showers are produced as one or the other influence predominates and operates with sufficient force. Thus, in most of our large extensive storms which originate upon the level interior of our country, the incipient condensation is discoverable in the upper story in the form of cirrus, or in the upper part of the trade story in the form of cirro-stratus. Subsequently the stratus is formed in the trade story in its inferior portion, and after that the wind and the scud are, by like induction and by attraction, produced in the surface story. In this class of cases the storm is originated by the positive inductive action of the electricity of the upper atmosphere.

"As a rule our general storms are initiated in the great central condition or in the polar zone, by the positive electricity of the upper story acting by induction upon the upper trade of the second story, surcharged with the vapor of evaporation from the surface where it originated.

"Induced electric excitement is felt far in advance of all storms. It influences animal and vegetable life, as we have seen. It checks and stops evaporation, and disturbs the combination of electricity with the vapor of the atmosphere, producing partial condensation and increasing humidity. It is a mistake to assume that the increase of humidity, as indicated by the hygrometer or by its deposition on surfaces, is owing to an actual increase of the amount of water in the atmosphere. Evaporation decreases before an increase of humidity is apparent, and humidity goes on increasing long after evaporation has ceased. This increase of humidity is, as I have said, the effect of electric induction disturbing the electricity of the vapor, and causing the apparent increase of humidity. There is, in fact, no sudden increase of the quantity of vapor in the air—it is simply *an increase of that which is uncombined.*

"I do not think we have yet arrived at a satisfactory solution of the barometric oscillations, and it may ultimately appear that they are occasioned by electric induction also.

"We have seen that the barometric changes are coincident with the electric and magnetic ones. Certain it is that the changes in the barometer and in the feelings of animals and plants are in advance of thermometric or hygrometric changes which can account for them. I think it is well established that the condensation consists in the formation of an infinite number of small vesicles which electricity can form and cold cannot, and very clear that the formation of cloud is an electric inductive process, and that in all extensive storms the primary inductive action is by the positive electricity of the upper story, and the forming process may generally be observed upon the advance portion of the storm."

Since Mr. Butler wrote his work the United States Government has established the Weather Bureau at Washington, and a system of Signal Stations throughout the country, which give us daily reports of the weather probabilities. The system will eventually become perfected and of great benefit to the agriculture of America.

APPARATUS USED IN THE STUDY OF THE ATMOSPHERIC SYSTEM.

The requisite apparatus for the investigation of the changes of the weather includes the Barometer, Thermometer (air and soil), Wind Vane, Anemometer or Wind Gauge, Rain-band Spectroscope, Hygrometer, Vaporimeter, Rain Gauge, Lysimeter or Drainage Gauge, the Telescope, the Telegraph, and the Mariner's Compass.

Mr. Harding, an English meteorologist, reports in respect to experiments

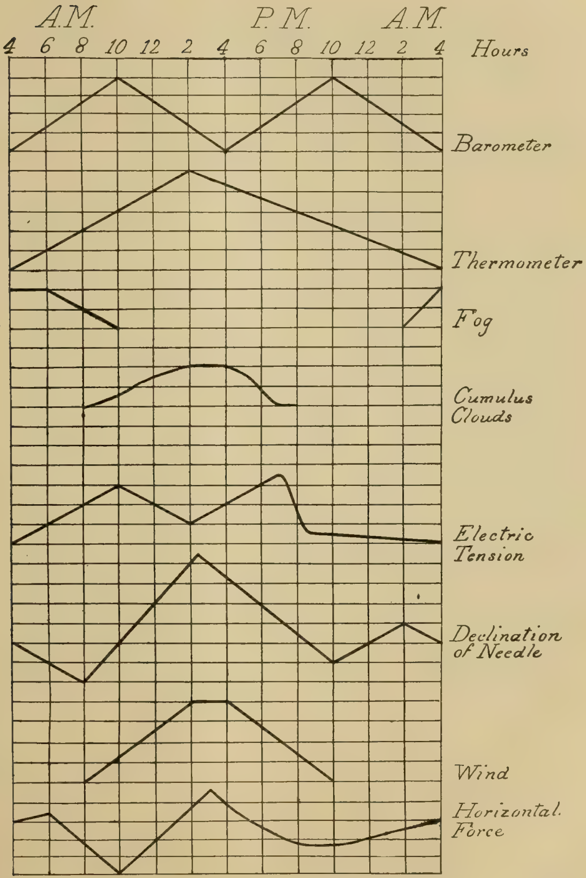


CHART SHOWING THE VARIATIONS DURING AN ATMOSPHERIC DAY IN FAIR WEATHER.

"of daily weather forecasts made with the rain-band spectroscope, that sixty-three per cent. proved approximately true, and only fourteen per cent. were false. On two very wet days the spectroscope gave no indication, and on two others it gave valuable warning in contradiction to the barometer."

The lysimeter, as used at the New York State Experiment Station at Geneva, has aided in demonstrating the benefit of fine surface pulverization in tillage for preventing the loss of moisture by excessive evaporation in drouth.

AVERAGE ANNUAL TEMPERATURE IN UNITED STATES.

Place.	Degree.	Place.	Degree.
Jacksonville, Florida	69	Salt Lake City, Utah Territory	52
New Orleans, Louisiana	69	Romney, West Virginia	52
Austin, Texas	67	Indianapolis, Indiana	51
Mobile, Alabama	66	Leavenworth, Kansas	51
Jackson, Mississippi	64	Hartford, Connecticut	50
Little Rock, Arkansas	63	Springfield, Illinois	50
Columbia, South Carolina	62	Camp Scott, Nevada	50
Raleigh, North Carolina	59	Des Moines, Iowa	49
Atlanta, Georgia	58	Omaha, Nebraska	49
Nashville, Tennessee	58	Denver, Colorado	48
Richmond, Virginia	57	Boston, Massachusetts	48
Louisville, Kentucky	56	Albany, New York	48
San Francisco, California	55	Providence, Rhode Island	48
Washington, D. C	55	Detroit, Michigan	47
St. Louis, Missouri	55	Fort Randall, Dakota Territory	47
Baltimore, Maryland	54	Concord, New Hampshire	46
Harrisburg, Pennsylvania	54	Augusta, Maine	45
Wilmington, Delaware	53	Madison, Wisconsin	45
Trenton, New Jersey	53	Helena, Montana Territory	43
Columbus, Ohio	53	Montpelier, Vermont	43
Portland, Oregon	53	St. Paul, Minnesota	42

AVERAGE ANNUAL RAINFALL OF DIFFERENT SECTIONS OF THE UNITED STATES.

Prepared by W. B. HAZEN, *Brig. Gen., Chief Signal Officer, U. S. A.*

LOCATION.	Rainfall. Inches.
NEW ENGLAND.	
Eastport, Me.	49.02
Portland, Me.	38.67
Mt. Washington, N. H.	83.86
Boston, Mass.	48.21
Block Island, R. I.	52.26
New Haven, Conn.	50.99
New London, Conn.	47.75
MIDDLE ATLANTIC STATES.	
Albany, N. Y.	38.05
New York, N. Y.	42.68
Philadelphia, Pa.	41.22
Atlantic City, N. J.	42.18
Barnegat City, N. J.	51.74
Cape May, N. J.	47.63
Sandy Hook, N. J.	51.26
Delaware Breakwater, Del.	31.76
Baltimore, Md.	41.98
Washington, D. C.	43.30
Cape Henry, Va.	57.82
Chincoteague, Va.	37.60
Lynchburg, Va.	41.34
Norfolk, Va.	52.13
SOUTH ATLANTIC STATES.	
Charlotte, N. C.	51.24
Hatteras, N. C.	75.44
Kitty Hawk, N. C.	64.90
Macon (Fort), N. C.	63.81
Smithville, N. C.	52.86
Wilmington, N. C.	57.42
SOUTH ATLANTIC STATES. *(Continued.)*	
Charleston, S. C.	59.89
Augusta, Ga.	49.91
Savannah, Ga.	52.86
Jacksonville, Fla.	55.33
FLORIDA PENINSULA.	
Cedar Keys, Fla.	58.95
Key West, Fla.	40.66
Sanford, Fla.	44.61
Punta Rassa, Fla.	42.61
EASTERN GULF STATES.	
Atlanta, Ga.	56.91
Pensacola, Fla.	70.22
Mobile, Ala.	65.84
Montgomery, Ala.	53.68
Vicksburg, Miss.	60.44
New Orleans, La.	64.69
WESTERN GULF STATES.	
Shreveport, La.	54.11
Fort Smith, Ark.	46.65
Little Rock, Ark.	57.64
Galveston, Tex.	51.43
Indianola, Tex.	38.22
Palestine, Tex.	43.49
RIO GRANDE VALLEY.	
Brownsville, Tex.	32.02
Rio Grande City, T.	25.12

AVERAGE ANNUAL RAINFALL OF DIFFERENT SECTIONS OF THE UNITED STATES—*Continued.*

Location.	Rainfall. Inches.
Ohio Valley and Tennessee.	
Chattanooga, Tenn.	59.42
Knoxville, Tenn.	53.20
Memphis, Tenn.	55.38
Nashville, Tenn.	53.63
Louisville, Ky.	48.83
Indianapolis, Ind.	47.59
Cincinnati, Ohio	44.09
Columbus, Ohio	44.62
Pittsburgh, Pa.	37.04
Lower Lakes.	
Buffalo, N. Y.	37.03
Oswego, N. Y.	36.05
Rochester, N. Y.	37.23
Erie, Pa.	42.39
Cleveland, Ohio	38.40
Sandusky, Ohio	41.78
Toledo, Ohio	33.07
Detroit, Mich.	35.27
Upper Lakes.	
Alpena, Mich.	38.21
Escanaba, Mich.	35.30
Grand Haven, Mich.	39.17
Mackinaw City, Mich.	38.97
Marquette, Mich.	32.68
Port Huron, Mich.	35.26
Chicago, Ill.	37.57
Milwaukee, Wis.	33.87
Duluth, Minn.	33.87
Upper Mississippi Valley.	
St. Paul, Minn.	29.83
La Crosse, Wis.	34.26
Upper Mississippi Valley. (*Continued.*)	
Davenport, Iowa	35.96
Des Moines, Iowa	42.72
Dubuque, Iowa	39.41
Keokuk, Iowa	38.57
Cairo, Ill.	46.33
Springfield, Ill.	48.61
St. Louis, Mo.	37.88
Missouri Valley.	
Leavenworth, Kan.	38.97
Omaha, Neb.	36.45
Bennett (Fort), Dak.	18.17
Huron, Dak.	25.68
Yankton, Dak.	28.21
Extreme Northwest.	
Moorhead, Minn.	29.48
St. Vincent, Minn.	18.62
Bismarck, Dak.	21.27
Buford (Fort), Dak.	16.08
Totten (Fort), Dak.	17.36
Northern Slope.	
Assiniboine (Fort), Mon.	13.93
Benton (Fort), Mon.	12.50
Custer (Fort), Mon.	14.36
Helena, Mon.	15.13
Maginnis (Fort), Mon.	13.29
Poplar River, Mon.	8.24
Shaw (Fort), Mon.	13.87
Deadwood, Dak.	26.47
Cheyenne, Wy.	10.72
North Platte, Neb.	19.97

AVERAGE ANNUAL RAINFALL OF DIFFERENT SECTIONS OF THE UNITED STATES—*Continued.*

Location.	Rainfall. Inches.	Location.	Rainfall. Inches.
Middle Slope.		Northern Plateau.	
Denver, Col.	14.98	Boise City, Idaho	13.30
Pike's Peak, Col.	31.60	Lewiston, Idaho	17.85
West Les Animas, Col.	13.41	Dayton, Wash.	28.11
Dodge City, Kan.	20.09	Spokane Falls, Wash.	20.31
Elliott (Fort), Tex.	21.48		
Southern Slope.		North Pacific Coast.	
Sill (Fort), Ind. T.	33.38	Canby (Fort), Wash.	45.71
Concho (Fort), Tex.	29.18	Olympia, Wash.	59.72
Davis (Fort), Tex.	19.83	Tatoosh Island, Wash.	75.18
Stockton (Fort), Tex.	19.43	Portland, Oregon	54.64
Southern Plateau.		Roseburg, Oregon	35.72
Santa Fé, N. M.	13.89		
El Paso, Tex.	12.11	Middle Pacific Coast.	
Apache (Fort), Ariz.	22.75	Cap Mendocino, Cal.	17.99
Grant (Fort), Ariz.	15.71	Red Bluff, Cal.	28.27
Prescott, Ariz.	14.51	Sacramento, Cal.	21.68
Thomas (Camp), Ariz.	10.31	San Francisco, Cal.	22.80
Yuma, Ariz.	2.04		
Middle Plateau.		South Pacific Coast.	
Winnemucca, Neb.	9.62	Los Angeles, Cal.	14.56
Salt Lake City, Utah.	16.91	San Diego, Cal.	9.48

Office, War Department,
Washington City, February 14, 1885.

WET WEATHER TALK.

BY J. W. RILEY.

"It ain't no use to grumble and complain ;
It's jest as cheap and easy to rejoice.
When God sorts out the weather and sends rain,
W'y, rain's my choice.

"Men gener'ly to all intents—
Although they're ap' to grumble some—
Puts most their trust in Providence,
And take things as they come—
That is, the commonality
Of men that's lived as long as me
Has watched the world enough to learn
They're not the boss of this concern.

"With some, of course, it's different.
I've see'd young men that knowed it all,
An' didn't like the way things went
On this terrestrial ball ;
But, all the same, the rain some way
Rained jest as hard on picnic day ;
Or when they really wanted it
It maybe wouldn't rain a bit !

"In this existence, dry and wet
Will overtake the best of men—
Some little shift o' clouds'll shet
The sun off now and then.
But maybe as you're wonderin' who
You've fool-like lent your umbrella to
And want it, out'll pop the sun,
And you'll be glad you ain't got none.

"It aggervates the farmers, too—
There's too much wet, or too much sun,
Or work, or waitin' round to do
Before the plowin's done.
And maybe, like as not, the wheat,
Jest as it's lookin' hard to beat,
Will ketch the storm—and jest about
The time the corn's a jintin' out !

"These here cyclones a foolin' round—
And back'ard crops—and wind and rain—
And yit the corn that's wallered down
May elbow up again!
The' ain't no sense, as I can see,
For mortals sich as you and me
A faultin' Nature's wise intents
And lock'n horns with Providence!

"It ain't no use to grumble and complain:
It's jest as cheap and easy to rejoice.
When God sorts out the weather and sends rain,
W'y, rain's my choice."

PART FIFTH.

THE JERSEY IN AMERICA.

CONNECTICUT.

It is the province of the historian to give due credit and honor to the individual or the commonwealth whose genius or wisdom has engaged in the initiation of any grand enterprise which, once entered upon and developed, causes results of beneficence to accrue in measureless flow to a nation and to mankind.

Connecticut is a small territory, and occupies but a speck upon the map of the world, yet how great has been the influence of her people upon American events and history. To the sterling character of her sons and daughters we may attribute much of the power and glory of national progress and the honor of the American name, as her people have ever been characterized in history for wisdom, inventive genius and patriotism. Among the honored names of her sons to whom we owe grateful remembrance may be mentioned Silas Deane, "through whose efforts Lafayette, Rochambeau, and others were induced to engage in the cause of independence"* during the darkest days of the Revolution. It was "by the learning and eloquence of William Samuel Johnson, the genuine good sense and discernment of Roger Sherman, and the didactic strength of Oliver Ellsworth, that the Federal Constitution came to be adopted, thereby giving to the people of the United States the best system of government upon the face of the earth."

It was Jonathan Trumbull, the great war governor, who, being the bosom friend and confidential adviser of Washington, received from him the appellation which has since become the patronymic for every American, "Brother Jonathan."

John Trumbull, a son of the governor, became the earliest of American historical painters.

In poetry no modern writer has appeared "who dared commit his fame to the keeping of so few lines, and no poet has seemed so well aware that to write little and well is to write much" as Fitz-Greene Halleck. Eli Whitney invented the cotton-gin, which developed the production of the material and manufactures of a great fabric staple throughout the world. "John Fitch was the first to apply steam to the uses of navigation," and "Junius Smith was the originator of the grand project for

* Quoted paragraphs are from "History of Connecticut," by G. H. Hollister.

navigating the ocean by the same motive power." "Samuel F. B. Morse, of Connecticut parentage and culture, invented the magnetic telegraph, and thus gave to the world a courier swifter than the light." "Jared Mansfield originated the present mode of surveying public lands."

"Ephraim Kirby published the first volume of Law Reports ever issued in the United States."

"Joseph Bellamy founded the first Sunday-school in the world. The first Temperance Society in Christendom was formed in this State. The first Asylum for the Deaf and Dumb ever instituted on this continent was established upon Connecticut soil; and the seeds of almost all the colleges in the Union have been carried from Connecticut fields and planted by Connecticut citizens."

"The first British flag that fell into the hands of the American patriots during the Revolutionary War, and the first British flags upon the land as well as on the sea that did homage to our valor in the War of 1812, were all struck to sons of Connecticut."

Jonathan Edwards was the most eminent theologian of the eighteenth century in this or any country.

Noah Webster, the great lexicographer, by his *Spelling-Book* and *Dictionary* became the schoolmaster of this Western World, and thus made it possible for the people of a continent to speak one common tongue.

Thomas B. Butler wrote *The Atmospheric System*, the first and only work that gives a rational and philosophical exposition of the organization of the atmosphere and the changes of the weather.

Elihu Burritt, blacksmith and farmer, who never went to college, was the first man in the world to acquire a thorough grammatical knowledge of more than fifty languages.

Maltby Fowler invented the ingenious machine which makes pins for all the world.

Alexander C. Twining was the inventor of the only feasible machine for the manufacture of ice.

E. E. Matteson was the inventor of the hydraulic process for washing out gold in the Tertiary deposits, a system which has immensely increased the yield and profitableness of gold-mining in California.

From Connecticut people, emigrating to other States of the American Union, have descended many of the most illustrious characters of modern times, including the greatest soldier and military commander of the nineteenth century, Ulysses S. Grant; the scholarly statesman, brilliant soldier, and martyr President, Garfield, and many others pre-eminent for patriotic service to their country, by devoted labors in the times of peace or war.

The people of Connecticut are also noted for longevity. From Perkins'

"Encyclopædia of Longevity" it appears that in the number of centenarians, and in length of human life, the United States leads all the countries of the world, while the State of Connecticut, in the proportion of centenarians, and in human longevity, reaches a higher average than any other portion of the globe.

It was fitting that Connecticut, the State of the oak and the vine, whose people are no less renowned for their interest in agriculture than all else that tends to build up a State—it was pre-eminently fitting that such a people should be the first in America to admire, appreciate and adopt the Jersey cattle.

From a Hartford correspondent of the *Country Gentleman* I quote the following "Reminiscences":

"The first importation of Jerseys recorded in the American Jersey Cattle Club Herd Register was made in 1850, in the ship Splendid, by a little club of gentlemen in Hartford.

"The suggestion was made by DANIEL BUCK, JR. He was familiar with their reputation as dairy cows for quantity, and especially for quality of butter, and in putting this before his friends had no difficulty in getting the order at once for an experimental herd. This was put into the care of JOHN A. TAINTOR, also of Hartford, who was then importing Merino sheep. It is believed to have been the first attempt to breed pure Jerseys in America, and SPLENDENS 16 was the first bull purchased on the Island of Jersey for importation into the United States.

"No better agent could have been found than Mr. Taintor. A perfect gentleman, with a good knowledge of human nature, a good judge of cattle also, a thorough business man, and a cool, judicious buyer, he was exactly the right man to execute a commission of this nature. This was to buy about a dozen of the best animals, including the best bull on the island, without limit in price, and without restriction as to color and fancy points.

"The importation was a great success. It is doubtful if, with all the supposed improvements in breeding during the past few years, there has ever been one of more uniform excellence. Nearly every one of these cows had the reputation of making over two pounds of butter a day, and each gentleman thought his own the best. The quality was even more of a surprise than the quantity. The firmness, and the rich color, even in winter, on ordinary feed that was then thought the proper allowance for a cow, was something quite astonishing.

"The superior dairy quality of the breed soon attracted the attention of the most advanced farmers, and other importations were made.

"John T. Norton, of Farmington, was one of the first to recognize their merits. He was fortunate in having a friend in Mr. Stetson, of the Astor House, New York, who appreciated and was willing to pay for such a superior article any price which Mr. Norton thought he ought to charge for his butter.

"Mr. Buck's product found ready sale in Hartford, far above the prices of what

were then the best dairies. I believe that Mr. Buck's was the first and Mr. Norton's the second herd established in this county. Since that time the number has constantly increased, until there are herds in nearly every town.

"Mr. Taintor saw SPLENDID 2 on one of his trips to the Island of Jersey, and on his return reported him to Mr. Norton as a perfect animal.

"He was ordered at once, and for a number of years stood at the head of Mr. Norton's herd.

"Mr. Norton highly prized him for the rich yellow skin which showed through the hair of his white patches."

I suppose that the two bulls *Splendens* 16 and *Splendid* 2 were thus named because of the brig "Splendid," which brought them across the ocean. This was indeed a happy augury, both in the vessel and her rich cargo, as has been well verified, not alone in the descendants of these famous bulls, but in the rich exhibit which the following pages show as the result of a genesis so auspiciously heralded, whose golden fruitage glows, as the seasons come and go, with ever-increasing splendor!

Of the near descendants of Splendens 16, none have recorded butter tests. His great-granddaughter Pansy 1019 made a record of 574½ pounds of butter in a year. Splendid has left a much stronger and richer impress upon the American Jersey records. Among his descendants, both immediate and remote, are the names of some of the richest cows ever known, one of them having produced a pound of butter from $5\frac{7}{11}$ pounds of milk, under an official test, and she has also made the largest yearly record in the world.

In the first cargo of Jerseys, along with the bull Splendens, were the cows Dot 7, Violet 23, Jessie 28, and the Ives Cow. Splendens 16 and Dot 7 produced Dolly 1021, the granddam of Pansy 1019.

In the year 1851 Mr. Taintor imported the bull Premium 7, in 1854 the bull Commodore 56 and the (afterward) noted bull CZAR 273 in his dam Jennie 686. In 1855, among the noted ones, Mr. Norton imported the wonderful cow PANSY 8, whose tested descendants outnumber those of any other Jersey. Among the noted bulls of later importations were SPLENDID 2, by Mr. Norton, ST. HELIER 45, by Mr. O. S. Hubbell, of Stratford, ROB ROY 17 and PIERROT 636, by Mr. S. C. Colt, of Hartford. Of the imported cows, sometime owned in the State, that have become famous, are DANDELION 2521, NANCY LEE 7618, COOMASSIE 11,874, ONA 7840, and PRINCESS 2D 8046. Some of the noted bulls bred in the State are MCCLELLAN 25, SAM 980, TOM DASHER 420, WETHERSFIELD 966, LIVING STORM 173, MONITOR 878, PIERROT 2D 1669, PIERROT 7TH 1667, RALPH 957, CHAMPION OF AMERICA 1567, BEESWAX 1931, BRISTOL CHIEF 1496, HURRAH 2814, LORD BRONX 2D 1730, ONOLI 1922, REX 1330, and SUPERB 1956. Among the many famous Connecticut-bred cows may be mentioned PANSY 6TH 38, PANSY 1019, LADY IVES 1708, COUCH'S

Lily 3237, Lucky Belle 2214, Volie 19,465, Hazen's Bess 7329, Hazen's Nora 4791, Chroma 4572, Evelina of Verna 10,971, Value 2d 6844, and Landseer's Fancy 2876. The first butter test reported in Connecticut was of Rose 240, by Mr. John T. Norton, in the year 1853, yielding seventeen pounds of butter in seven days.

The Ives Cow, in the first importation of 1850, Splendens 16, and Splendid 2, each appear twice in the pedigree of **LANDSEER'S FANCY** 2876, the champion cow of the world, she having made the largest annual yield of butter ever yet recorded.

MASSACHUSETTS.

According to the Herd Register, the first importation of adult bulls into Massachusetts was made by Mr. Thomas Motley, in the year 1851. This importation included Colonel 76, Typhoon 77, and "Gen. Lyman's Bull" 833, with such noted cows as Flora 113 and Countess 114. In the previous year Mr. Samuel Henshaw, of Boston, had imported the cows Daisy 382 and Buttercup 557; and Daniel Webster imported for Mr. F. Haven, of Boston, the cow Jenny Lind 552. The bull Sailor 169 was dropped on shipboard for Mr. Henshaw, June 12th, 1850.

Of the later importations, Sam Weller 271, Cœur de Lion 318, Mr. Micawber 556, Broker 873, Lopez 313, and Landseer 331, are worthy of celebrity.

Of imported cows, Dazzle 379 deserves to be held famous.

Among noted bulls bred in the State are Dick Swiveller Jr. 276, Cliff 176, Victor 3550, and Homer H. 3683.

Of the famous Bay State bred cows are Maud Lee 2416, Meines 3d 7741, Mink 2548, and Jersey Belle of Scituate 7828, the choicest model of perfection ever known.

The first butter test ever reported was made in Massachusetts of the cow Flora 113, by Mr. Motley, in February, 1853, when at three years old, eight months from second calf, and two and a half months before third calf, upon average feed, she made fourteen and a half pounds in seven days. After third calf, Flora made five hundred and eleven pounds two ounces of butter in fifty weeks.

OTHER STATES.

It appears from the Herd Register that John Glenn, of Baltimore, was the pioneer breeder of Jerseys in Maryland, having imported cows in 1851.

In the State of New York Samuel Thorne, of Thorndale, imported Jerseys in 1855, as did also R. L. Colt, of Paterson, in the State of New Jersey, and E. M. Hopkins, of Philadelphia, Penn.

From these apparently feeble beginnings the growth of the Jersey interest has gradually extended, until it now permeates nearly every State of the Union. At the first there were many hindrances to rapid popularity and success; for although the earliest breeders were men of culture and high character, and possessed with perseverance and persistency of purpose, yet not until 1868 was there any movement for establishing a pure Herd Register, nor any well-organized effort to insure community of interest and establish pure pedigree breeding upon an infallible basis. The cattle were misnamed "Alderney," in England, and the same appellation was applied here, no race distinction being made between the cattle of the various Channel Islands, except as they were sometimes called "Jersey Alderney" and "Guernsey Alderney." The majority of American breeders, however, greatly preferred the cattle of Jersey, and bred them pure. There had been importations of cattle from those islands into Pennsylvania as far back as the year 1817, or earlier, but the cows were bred to native and mongrel bulls, and the value of the animals for all purposes of thorough breeding was dissipated and lost.

CANADA.

The pioneer breeder of Canada was Mr. S. S. Stephens, of Montreal. An importation of Jersey cattle made by him August 17th, 1868, consisted of the bull Victor Hugo 197 and five cows from the Island of Jersey, besides the bull Defiance 196 and the cows Pride of Windsor 483, Amelia 484, and Juliet 485, from the "Shaw Farm," Windsor Park, England. The Island cows, including Hebe 489, dropped island-bred calves, all heifers, Hebe's calf being the since famous cow PAULINE 494.

These cattle, whose blood has been combined with the blood of stock imported from England into Vermont, by Peter Leclair, has resulted in the St. Lambert strain, that has become so far-famed for great butter tests, in the herd of Mr. Valancey E. Fuller, Hamilton, Ontario.

THE AMERICAN JERSEY CATTLE CLUB.

The organization of the American Jersey Cattle Club began, in the year 1868, with forty-three members, but not until the year 1875 did the first volume of the Herd Register appear in print, containing the names of 539 bulls and 1427 cows, to date of 1871.

In December, 1874, the number of Club members was 94. The organization was incorporated by statute of the State of New York passed April 19th, 1880. The Club has been very prosperous, and on August 15th, 1885, had an active membership of

370, distributed as follows: Alabama, 4; California, 7; Connecticut, 32; Delaware, 1; Georgia, 5; Illinois, 8; Indiana, 9; Iowa, 3; Kansas, 1; Kentucky, 16; Louisiana, 3; Maine, 4; Maryland, 17; Massachusetts, 35; Michigan, 2; Minnesota, 2; Mississippi, 10; Missouri, 6; New Hampshire, 3; New Jersey, 42; New York, 58; Ohio, 13; Oregon, 1; Pennsylvania, 37; Rhode Island, 10; South Carolina, 2; Tennessee, 14; Texas, 1; Vermont, 8; Virginia, 2; West Virginia, 1; Wisconsin, 9; Canada, 6.

Since its origin, in 1868, four members have resigned and fifty have died.

This body of men represents more wealth and influence than any other similar organization in the world. Besides the membership of the Club, there is a large and rapidly increasing number of breeders—about three thousand—scattered in every portion of America.

HISTORY OF BUTTER TESTS.

In a prize essay for the Cattle Club written by Colonel George E. Waring, Jr., and published by the Club in 1871, mention is made of only one butter test, and that, one that had been made eighteen years before the essay was written. The first butter test, as before stated, was that of the cow Flora 113, in the year 1853. In the same year Rose 240 was tested, yielding seventeen pounds in seven days. From all the records and reports of butter tests that have been published, the author of this work has compiled a table numbering nearly 1100 cows, that have yielded fourteen pounds or more in seven days. After Rose 240, in 1853, I find no dated test until a period of fourteen years later, when the cow Eureka McHenry 8341 was tested by Mr. A. E. Kapp, Northumberland, Pa., from June 5th to 11th, 1867, yielding fourteen pounds of unsalted butter.

After another interval of more than five years a test of the imported cow Jennie 766, from September 10th to 16th, 1872, by Mr. W. B. Dinsmore, of Staatsburgh, N. Y., yielded fourteen pounds nine ounces of butter.

About October 1st, 1872, began the test of the noted cow Pansy 1019, by Mr. John H. Sutliff, Bristol, Conn. Pansy was five years old December 13th, 1871, the test being concluded when she was a little more than six and a half years old, and the yield $574\frac{1}{2}$ pounds of butter for one season between calves. The feed was, in summer, pasture and two quarts of corn meal daily; in winter two bushels of cut hay and six quarts of meal daily, divided in two feeds, besides a feed of dry hay at noon.

The cow Plenty 950 was tested in 1873, with a yield of $14\frac{10}{16}$ pounds at ten years old.

The tests of Pansy 1019 and Couch's Lily 3237 gave a new impulse to Jersey breeding, causing many to embark in what were styled "experimental herds."

Many of the tests that have become fixed in Jersey history fail to show the date of the test, the amount of feed, weight of milk, or age and weight of cow.

Of the tests as dated there were, in 1853, 2; in 1867, 1; in 1872, 2; in 1873, 1; in 1874, 4; in 1875, 5; in 1876, 6; in 1877, 5; in 1878, 8; in 1879, 4; in 1880, 14; in 1881, 35; in 1882, 79; in 1883, 185; in 1884, 190; in 1885, about 175.

The official tests made under the supervision of committees appointed by the President and Directors of the American Jersey Cattle Club are dated as follows: In 1882, 1; in 1883, 6; in 1884, 8; in 1885, 13.

Of the twenty-eight officially tested Jerseys, twenty-five cows gave larger yields than by previously made private tests, and three cows gave smaller yields than by private tests, the latter under adverse conditions.

QUALITY OF AMERICAN JERSEYS.

The American Jersey has been undergoing for many years a process of refining and improving, by the selection of butter bulls containing finer qualities of fibre and anatomical conformation better adapted to produce butter dairy cows of a high order. These qualities can be heightened by continual selection and through better breeding, adhering strictly to butter-producing families and close inbreeding to the best individuals in those families. As an instance of selection, the bull St. Helier 45 was bred to order on the Island of Jersey by Mr. Philip Quenault, of St. Martin, for Mr. O. S. Hubbell, of Stratford, Conn., Mr. Hubbell having previously employed competent persons upon the island to make private butter tests from milk purchased of the best breeders. These tests were carried on for a period of five years, having continued from 1862 to 1867, when St. Helier was bred, out of a family that had been started some forty years before and inbred continuously, and constituting the best butter-bred herd on the island. The dam of St. Helier tested over three pounds of butter daily. For the bull calf dropped in 1868 the sum of $1500 was paid, which, with the previous expenses of testing cows and cost of importation, brought the price up to $2500, then the highest price that had been paid for a Jersey. The Jersey breed has been built up through centuries of selection, and in certain families and strains has become such a grand type that it cannot be improved by any cross with any other breed of dairy cattle; but it improves every dairy race upon which it is crossed, so that the best dairy grades, cross-breds or full-breds, may be produced by the use of Jersey sires, whatever may be the race of the dam.

The finest examples of Jersey breeding have been produced in America by American breeders. The vicissitudes of our climate, ranging from the frozen regions of Labrador to the orange-groves of Florida, the prairies of the West, and the mild climate of the Pacific coast, will in time develop new types of the Jersey.

Already, under the magneto-electric intensity of our climatic conditions, the Jersey of several generations of American inheritance is of larger size and possessed of a stronger constitution, while the grand characteristic faculty of cream-secretive power has been intensified and increased. Selection of rare individuals and their inbred progeny, with regard to increase of constitutional vigor, will yet bring the average of the Jersey breed to a much higher degree of perfection than has ever been thought attainable by our best breeders.

JERSEY FOUNTAINS.

"Each fountain takes the force of vein it coucheth in."—*Lidgate.*

The following list of celebrated animals, beginning with the first Jersey bull imported into America, is arranged in historical order of year of birth, or date of importation when age is not given.

LEGEND.

A. J. C. C. H. R.—American Jersey Cattle Club Herd Register.

J. H. B.—Jersey Herd Book.

E. H. B.—English Herd Book.

Italics in chart pedigrees or headings indicate imported animals.

H. C.—Highly Commended, Jersey.

C.—Commended, Jersey.

R. J. A. S.—Royal Jersey Agricultural Society.

J. F. A.—Jersey Farmers' Association.

Full-face type indicates official butter tests of the American Jersey Cattle Club.

Full-face italics indicate official butter tests of the Jersey Farmers' Association, Island of Jersey.

Full-face capitals indicate that the animal so designated leads in a given class or table.

Animals not recorded in the A. J. C. C. H. R. are designated by a dash ——.

NOTE.

The butter tests in the following tables include all that have been reported directly to the author, as well as those reported in the current Jersey literature.

These tables are designed to include every cow that has made a seven-day test.

If any cow is included herein upon a partial or a fictitious report, the author will be under great obligations to any one who will furnish correct information regarding such animal, in order to enable him to revise and perfect the tables for future editions of this work.

1850.

BULLS.

SPLENDENS 16.

Color, dark brown, black and white. Imported in Brig Splendid by John A. Taintor, for Daniel Buck, Jr., Hartford, Conn., in the year 1850.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Canto 7194	25	15	lbs.	12	oz.
Pansy 1019 (rated)	12½	20	"	0	"
" " (year)		574	"	8	"
Almeda 3842	12½	15	"	5	"
Herberta 8811	$10\frac{5}{32}$	15	"	5	"
Webster's Pet 4103	9⅜	14	"	2	"
Maggie Mitchell ——	6¼	18	"	12	"
Hepsy 2d 12,008	6¼	17	"	8	"
Palestine 3d 1104	6¼	16	"	8	"
Princess of Mansfield 8070	6¼	15	"	2	"
New London Gipsy 11,667	6¼	14	"	8	"
Silveretta 6852	$4\frac{11}{16}$	16	"	9	"
Tobira 8400	$4\frac{11}{16}$	15	"	13	"
GILT EDGE C. 12,223	$4\frac{11}{16}$	**15**	"	**9½**	"
Princess Sheila 7297	$4\frac{11}{16}$	15	"	8	"
Champion's Chloe 12,225	$4\frac{11}{16}$	15	"	5½	"
Dairy C. 12,227	$4\frac{11}{16}$	15	"	0½	"
Arnold's Lulu 7328	$4\frac{11}{16}$	15	"	0	"
Coronilla 8367	$4\frac{11}{16}$	14	"	9½	"
Lady Greville 12,930	$4\frac{11}{16}$	14	lbs.	6	oz.
Maggie C. 12,216	$4\frac{11}{16}$	14	"	6	"
Minnie Lee 2d 12,926	$4\frac{11}{16}$	14	"	6	"
Therese M. 8364	$4\frac{11}{16}$	14	"	2	"
Jessie Leavenworth 8248	$4\frac{11}{16}$	14	"	0	"
VALUE 2d 6844	3⅛	**25**	"	$\mathbf{2\frac{11}{12}}$	"
LANDSEER'S FANCY 2876	3⅛	**21**	"	**15**	"
Lily Scituate 12,665	3⅛	24	"	9½	"
Hypathia 2d 14,774	3⅛	19	"	13½	"
Colt's La Biche 6399	3⅛	17	"	2½	"
Marie C. Magnet 22,903	3⅛	15	"	8	"
Palestina 4644	3⅛	15	"	8	"
Frances C. Magnet 22,904	3⅛	14	"	13½	"
Pet Clover 14,624	$1\frac{9}{16}$	16	"	8	"
Rosabel Hudson 5704	$1\frac{9}{16}$	15	"	12	"
Grandiflora 9953	$1\frac{9}{16}$	15	"	8	"
Rosy Dream 9808	$1\frac{9}{16}$	14	"	13	"
Total, 35 *cows*.					

1851.

BULLS.

COLONEL 76.

Color, steel gray and white. First prize over Jersey. Dam reputed best cow on island. Imported by Thomas Motley, Jamaica Plains, Mass., May 19th, 1851. He was rich and stylish, and left a good impress upon our earliest foundation stock.

COWS.

FLORA 113.

Color, fawn and white. Imported May 19th, 1851, by Thomas Motley. Famous for beauty and richness, and worthy of a place in history as the first cow tested for one week and also for one year.

Butter yield in seven days, 14 lbs. 8 oz. Fifty weeks, 511 lbs. 2 oz.

COUNTESS 114.

Color, fawn and white. Imported by Thomas Motley, 1851. Tested as an aged cow. Butter yield in seven days, 16 lbs.

Flora 113 and Countess 114 were among the best in quality of the early importations.

Colonel 76 and Countess 114 form the background in many noted pedigrees, among them Jersey Belle of Scituate 7828 and Moss Rose of Willow Farm 5174. The latter inherited through four lines $35\frac{15}{16}$ per cent. of the blood of Countess 114, and was the product of breeding son to dam.

1854.

BULLS.

CZAR 273.

Imported in dam Jennie 686, by John A. Taintor, Hartford, Conn., in 1854.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Dolly of Lakeside 10,824	$31\frac{1}{4}$	14 lbs.	8 oz.
Clara of Lakeside 10,627	$27\frac{7}{16}$	15 "	0 "
Sylvia 687	25	15 "	8 "
Cressy of Deerfoot 15,324	25	14 "	0 "
Jersey Belle of Scituate 7828	$23\frac{1}{16}$	25 "	3 "
Minnie of Scituate 17,829	$19\frac{53}{64}$	14 "	$4\frac{1}{2}$ "
Christmas Nannie 4075	$12\frac{1}{2}$	19 "	7 "
Abbie Z. 3d 14,742	$12\frac{1}{2}$	17 "	0 "
Countess Micawber 1759	$12\frac{1}{2}$	16 "	8 "
Patty of Deerfoot 15,324	$12\frac{1}{2}$	16 "	0 "
Deerfoot Girl 15,329	$12\frac{1}{2}$	15 "	8 "
Darling of Neatham 20,086	$12\frac{1}{2}$	15 "	3 "
Polly of Deerfoot 15,328	$12\frac{1}{2}$	15 "	0 "
Dena of Deerfoot 15,325	$12\frac{1}{2}$	14 "	8 "
Daisy of Chenango 18,582	$12\frac{1}{2}$	14 "	7 "
Gilda 2779	$12\frac{1}{2}$	14 "	6 "
Cressy of Deerfoot 15,324	$12\frac{1}{2}$	14 "	0 "
Belle of Scituate 7977	$11\frac{17}{32}$	18 lbs.	0 oz.
Pauline's Vivienne 11,305	$11\frac{17}{32}$	16 "	13 "
Lass of Scituate 9555	$11\frac{11}{32}$	15 "	14 "
Thorndale Belle 5265	$9\frac{3}{8}$	14 "	8 "
Jenny Dodo H. 14,448	$6\frac{1}{4}$	21 "	8 "
Roland's Bonnie 2d 18,054	$6\frac{1}{4}$	19 "	2 "
PERCIE 14,937	$6\frac{1}{4}$	18 " / **14** "	10 " / **$6\frac{1}{2}$** "
Lily of Burr Oaks 11,001	$6\frac{1}{4}$	15 "	13 "
Scituate of Woronoco 18,040	$5\frac{49}{64}$	24 "	14 "
Lily Scituate 12,665	$5\frac{49}{64}$	24 "	$9\frac{1}{2}$ "
Lydia Libby 11,698	$4\frac{11}{16}$	15 "	3 "
Deletta 21,305	$4\frac{11}{16}$	14 "	$15\frac{1}{2}$ "
Hilda A. 2d 11,120	$3\frac{1}{8}$	20 "	0 "
Snowdrop F. W. 16,948	$3\frac{1}{8}$	14 "	8 "

Total, 31 *cows*.

1855.

COWS.

PANSY 8.

Color, light silver gray fawn. Imported by John A. Taintor for John T. Norton, Farmington, Conn., in 1855.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Pansy 1019 (rated)	37½	20	lbs.	0	oz.
" " (year)	37½	574	"	8	"
Lady Brown 433	25	14	"	0	"
Champion Chloe 12,155	21¼	15	"	5½	"
Maggie 3d 3221	18¾	17	"	8	"
Peggy Leah 3097	15⅝	18	"	12	"
Maggie C. 12,216	15⅝	14	"	6	"
Maggie May 2d 12,926	15⅝	14	"	6	"
Webster's Pet 4103	15⅝	14	"	2	"
Oktibbeha Duchess 4422	12½	16	"	14	"
Dimple 3248	12½	16	"	11	"
Cascadilla 3103	12½	15	"	12	"
Mary Clover 9998	12½	14	"	15	"
Lady Brown 4th 6911	12½	14	"	12	"
Linda 3d 3219	12½	14	"	3	"
Maggie May 3255	12½	14	"	2½	"
May Blossom 5657	9⅜	18	"	11	"
Gabrielle Champion 14,102	9⅜	17	"	8	"
Silveretta 6852	9⅜	16	"	9	"
Princess Sheila 7297	9⅜	16	"	4½	"
Belle of Vermilion 8798	9⅜	15	"	14	"
Tobira 8400	9⅜	15	"	13	"
GILT EDGE C. 12,223	9⅜	**15**	"	**9½**	"
Marie C. Magnet 22,903	9⅜	15	"	8	"
Dairy C. 12,229	9⅜	15	"	0½	"
Clover Bloom 9783	9⅜	14	"	14½	"
Coronilla 8367	9⅜	14	"	9½	"
Lady Greville 12,930	9⅜	14	"	6	"
Minnie Lee 2d 12,941	9⅜	14	"	3	"
Therese M. 8364	9⅜	14	"	2	"
Jessie Leavenworth 8248	9⅜	14	"	0	"
Ethalka 2d 14,128	8 13/32	15	"	0	"
Cordelia Baker 8814	7 13/16	17	"	9	"
Hurrah Pansy 12,153	7 13/16	14	"	1½	"
Celeste Cox 12,948	6 23/64	20	"	8	"
Geranium 2d 7838	6¼	26	lbs.	4¾	oz.
Fadette of Verna 3d 11,122	6¼	22	"	8½	"
Tenella 6712	6¼	22	"	1½	"
Croton Maid 5305	6¼	21	"	11½	"
Optima 6715	6¼	21	"	8½	"
Œnone 8614	6¼	18	"	15	"
Princess Mostar 9700	6¼	17	"	3	"
Katie Bashford 15,982	6¼	17	"	0	"
Valhalla 5300	6¼	17	"	0	"
Jersey Cream 3151	6¼	17	"	0	"
Belle of Patterson 5664	6¼	16	"	10	"
Edwina 6713	6¼	15	"	13	"
Valerie 6044	6¼	15	"	13	"
Fanny Taylor 6714	6¼	15	"	12	"
Signalana 7719	6¼	15	"	4	"
Aldarine 5301	6¼	15	"	1½	"
Oxalis 606	6¼	15	"	0	"
Olie 4133	6¼	15	"	0	"
Heartsease 503	6¼	15	"	0	"
Lady Gray of Hilltop 2d 14,641	6¼	14	"	12	"
Bloomfield Lady 6912	6¼	14	"	12	"
Pansy K. 23,889	6¼	14	"	9	"
Deborana 4718	6¼	14	"	8	"
La Pera 2d 13,404	6¼	14	"	8	"
Lilley Rex 9852	6¼	14	"	7	"
Lady Gray of Hilltop 3d 14,642	6¼	14	"	2	"
Creamer 2467	6¼	14	"	1	"
Melody 26,891	6¼	14	"	1	"
Elmora Mostar 15,955	6¼	14	"	0	"
Pansy 602	6¼	14	"	0	"
Pet Clover 14,624	5 55/64	16	"	8	"
Guinevere Sinclair 11,167	5 13/16	14	"	9	"
Signetilia 16,333	5 13/16	14	"	3	"

Name.	Blood, Per Cent.	Butter Yield in Seven Days. lbs.	oz.
Polly Clover 7052	$4\frac{11}{16}$	16	15
Orphean 4636	$4\frac{11}{16}$	15	7
Chautauqua Queen 26,403	$4\frac{11}{16}$	14	11
Bell Rex 11,700	$4\frac{11}{16}$	14	10
Clover Mel 16,159	$4\frac{11}{16}$	14	9
Kate Daisy 8204	$4\frac{11}{16}$	14	4
Baby Buttercup 10,888	$4\frac{11}{16}$	14	0
Hazen's Nora 4791	$3\frac{29}{32}$	20	4
TETTE 20,802	$3\frac{29}{32}$	**17**	**6**
Flora Lee of Tennessee 7694	$3\frac{29}{32}$	16	5
Frances C. Magnet 22,904	$3\frac{33}{64}$	14	$13\frac{1}{2}$
VALUE 2d 6844	$3\frac{1}{8}$	**25**	**$2\frac{11}{12}$**
Hazen's Bess 7329	$3\frac{1}{8}$	24	11
Atlanta's Beauty 12,949	$3\frac{1}{8}$	21	3
Lady Mel 2d 1795	$3\frac{1}{8}$	21	0
Fairy of Verna 2d 10,973	$3\frac{1}{8}$	20	$3\frac{3}{4}$
Hilda A. 2d 10,793	$3\frac{1}{8}$	20	0
Gardiner's Ripple 11,693	$3\frac{1}{8}$	19	$12\frac{1}{2}$
EVELINA OF VERNA 10,971	$3\frac{1}{8}$	**19**	**10**
Tenella 2d 19,521	$3\frac{1}{8}$	18	12
Harmony 2d 17,118	$3\frac{1}{8}$	18	3
Signaldella 24,107	$3\frac{1}{8}$	18	$1\frac{3}{4}$
Reckless 3569	$3\frac{1}{8}$	17	8
Chamomilla 7552	$3\frac{1}{8}$	16	10
Belle Mardi 18,362	$3\frac{1}{8}$	16	8
Olie's Lady Teazle 12,307	$3\frac{1}{8}$	16	5
Gazella 3d 9355	$3\frac{1}{8}$	16	3
Alhena 15,995	$3\frac{1}{8}$	16	3
Dahlia ——	$3\frac{1}{8}$	16	0
Pansy Patterson 18,612	$3\frac{1}{8}$	15	15
Rupertina 10,409	$3\frac{1}{8}$	15	$12\frac{1}{2}$
Ultima 14,456	$3\frac{1}{8}$	15	12
Friz Cam 14,655	$3\frac{1}{8}$	15	7
Enigma 5360	$3\frac{1}{8}$	15	6
Bronze Leaf 14,902	$3\frac{1}{8}$	15	1
Signal Maid 19,361	$3\frac{1}{8}$	15	0
Oxalis 2d 15,631	$3\frac{1}{8}$	15	0
Earl Cow ——	$3\frac{1}{8}$	15	0
Mary Clover 9998	$3\frac{1}{8}$	14	15
Duchess of Argyle 3758	$3\frac{1}{8}$	14	13
Cowle's Nonsuch 6199	$3\frac{1}{8}$	14	12
Magnibel 7976	$3\frac{1}{8}$	14	12
Jersey Cream 2d 8519	$3\frac{1}{8}$	14	12
Reception 3d 11,025	$3\frac{1}{8}$	14	10
Euphorbia 11,229	$3\frac{1}{8}$	14	$9\frac{3}{4}$
Lady Clarendon 3d 17,578	$3\frac{1}{8}$	14	$5\frac{1}{2}$
Adina 1942	$3\frac{1}{8}$	14	4
Gem of Sassafras 8434	$3\frac{1}{8}$	14	$3\frac{1}{2}$
Helve 4565	$3\frac{1}{8}$	14	0
Alice Donald ——	$2\frac{7}{16}$	14	0
Rosona 12,956	$2\frac{11}{32}$	16	7
Belmeda 6229	$2\frac{11}{12}$	18	12
Dollie Dale 16,140	$2\frac{11}{12}$	15	7
Fall Leaf 8587	$2\frac{11}{12}$	14	10
Mollie Garfield 12,172	$1\frac{9}{16}$	22	12
Alberta Signal 18,611	$1\frac{9}{16}$	20	11
Mary Norton 13,052	$1\frac{9}{16}$	17	14
Rosaline of Glenmore 3179	$1\frac{9}{16}$	17	10
Embla 4799	$1\frac{9}{16}$	17	8
Renalba 4117	$1\frac{9}{16}$	17	$4\frac{1}{2}$
Creole Maid 11,017	$1\frac{9}{16}$	16	15
Herberta 8811	$1\frac{9}{16}$	16	15
Joan d'Arc 2163	$1\frac{9}{16}$	16	$13\frac{1}{2}$
Willis 2d 4461	$1\frac{9}{16}$	16	3
Dom Pedro's Julian 8631	$1\frac{9}{16}$	16	0
Mary Hinman 17,619	$1\frac{9}{16}$	15	$11\frac{1}{2}$
Arawana Buttercup 6052	$1\frac{9}{16}$	15	5
Arawana Poppy 6053	$1\frac{9}{16}$	15	2
Bellini's Maid 15,170	$1\frac{9}{16}$	15	$1\frac{1}{2}$
Ampelis 5th 17,548	$1\frac{9}{16}$	15	0
Bellini La Biche 15,091	$1\frac{9}{16}$	14	$14\frac{1}{2}$
Chillis of Hillcrest 9067	$1\frac{9}{16}$	14	12
Thorndale Belle 5265	$1\frac{9}{16}$	14	8
Belle of Uwchland 8468	$1\frac{9}{16}$	14	7
Susie La Biche 3d 15,171	$1\frac{9}{16}$	14	$6\frac{1}{2}$
Marpetra 10,284	$1\frac{9}{16}$	14	6
Lebanon Daughter 6106	$1\frac{9}{16}$	14	4
Prince's Bloom 9729	$1\frac{9}{16}$	14	3
Lilian Mostar 10,364	$1\frac{9}{16}$	14	3
Lebanon Lass 6108	$1\frac{9}{16}$	14	2
Silene 4307	$1\frac{9}{16}$	14	0
Hillside Gem 16,640	$0\frac{25}{32}$	20	0
Goldthread 4945	$0\frac{25}{32}$	16	9
Louvie 3d 6159	$0\frac{25}{32}$	14	13
Roll of Honor 12,610	$0\frac{25}{32}$	14	12
Nannie Fitch 9143	$0\frac{25}{32}$	14	4
Duchess of Manchester 20,838	$0\frac{25}{32}$	14	0
Total, 154 *cows*.			

I have given almost a full table of the tested descendants of this noted cow to

the seventh generation, in order to show the remarkable prepotency of the Pansy blood. Although none of her near descendants were tested, yet this table shows that her name appears in the pedigree of about one in seven of all the cows that have been tested for butter. Her first calf, imported in dam, was the bull York 8, her last calf the bull Living Storm 173. Among her daughters, which were all good cows, were Pansy 2d 259, Pansy 5th 414, Pansy 6th 38, and Pansy 7th 130.

Pansy 6th 38 was the best of her progeny, and gave twenty-four quarts of milk daily at the flush, but was never tested for butter.

In order to get Pansy 6th 38, Mr. S. W. Robbins, of Wethersfield, Conn., purchased the whole herd of Mr. John T. Norton, comprising thirteen animals, and including Pansy 8, with her daughters Pansy 4th, Pansy 5th, Pansy 6th and Pansy 7th. Mr. Robbins says that "Pansy 6th 38 was the handsomest and best cow he ever owned, and that the Pansys were all remarkable for quality of milk, with udders as near perfection as any seen to-day, and grand cows for yield."

The light silver fawn color of Pansy 8 and Pansy 6th 38, with their peculiar markings, I have seen in their descendants of the sixth and seventh generation, although possessing but as small a fraction as $\frac{1}{32}$ or $\frac{1}{64}$ of the Pansy blood.

1856.

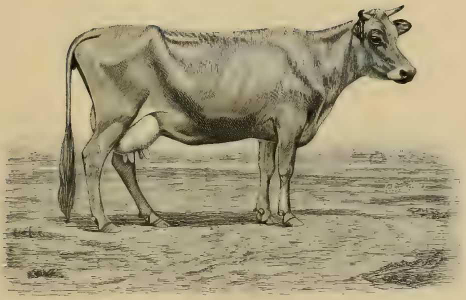
BULLS.

SPLENDID 2.

Color, light fawn and white ; rich yellow skin. Imported by John A. Taintor, of Hartford, for John T. Norton, of Farmington, Conn., in the Brig Splendid, May 30th, 1856, and kept at the head of the Norton Herd five years, when he was killed.

The daughters of Splendid were not generally tested, except for quality of milk, some of them producing a pound of butter from less than four quarts of milk, when fed with ordinary farmer's feed rations of that day. He was doubtless the richest bull ever imported from Jersey, and his quality appears very richly in **LANDSEER'S FANCY 2876,** the champion cow of the world.

The solid color fashion had not begun to be entertained in his day by Jersey breeders on this side of the Atlantic. His blood is obtainable in small percentage only, but ought to be sought out and concentrated as much as possible in a family line.



FLORALIA 6230.

Couch's Lily—Clement—Comus Type.

HIGHLAND HERD.

JAMES N. SMITH, LITCHFIELD, CONNECTICUT.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Rose 3d 913	50	16 lbs.	0 oz.
Rose 2d 239	50	16 "	0 "
Lady Ives 1708	$37\frac{1}{2}$	18 "	0 "
Belle of Bloomfield 4331	$37\frac{1}{2}$	14 "	0 "
(Maggie Mitchell) ——	25	18 "	12 "
Palestine 3d 1104	25	16 "	8 "
Copper 1979	25	15 "	7 "
Maggie 3d 3221	$18\frac{3}{4}$	17 "	10 "
Lady Ives 3d 6740	$18\frac{3}{4}$	14 "	8 "
Louvie 3d 6159	$17\frac{3}{16}$	14 "	13 "
Maggie Rex 28,623	$15\frac{5}{8}$	17 "	$0\frac{1}{2}$ "
Chloe Beach 3931	$15\frac{5}{8}$	14 "	8 "
Kate Daisy 8204	$15\frac{5}{8}$	14 "	4 "
Rosa Miller 4333	$14\frac{1}{16}$	17 "	7 "
LANDSEER'S FANCY 2876	$12\frac{1}{2}$	**21** "	**15** "
Queen Victoria ——	$12\frac{1}{2}$	19 "	0 "
Pansy of Bellewood 2d 890	$12\frac{1}{2}$	18 "	0 "
Dusky 2525	$12\frac{1}{2}$	16 "	10 "
Couch's Lily 3237	$12\frac{1}{2}$	16 "	9 "
Alhena 15,995	$12\frac{1}{2}$	16 "	3 "
Canto 7194	$12\frac{1}{2}$	15 "	12 "
Palestina 4644	$12\frac{1}{2}$	15 "	8 "
Arawana Buttercup 6052	$12\frac{1}{2}$	15 "	5 "
Rene Ogden 1568	$12\frac{1}{2}$	15 "	0 "
Abbie Z. 14,002	$12\frac{1}{2}$	14 "	11 "
Zina 1434	$12\frac{1}{2}$	14 "	7 "
Lady Fanning 11,169	$12\frac{1}{2}$	14 "	6 "
Fandango 12,908	$12\frac{1}{2}$	14 "	3 "
Pretty 2526	$12\frac{1}{2}$	14 "	0 "
CARRIE LENA 3d 20,077	$11\frac{43}{64}$	**16** "	**5** "
Bell Rex	$9\frac{49}{64}$	14 "	10 "
Hazen's Nora 4791	$9\frac{3}{8}$	20 "	4 "
PERCIE 14,937	$9\frac{3}{8}$	18 "	10 "
		14 "	**$6\frac{1}{2}$** "
Hepsy 2d 12,008	$9\frac{3}{8}$	17 "	8 "
Arawana Queen 5368	$9\frac{3}{8}$	16 "	9 "
Calypris 5643	$9\frac{3}{8}$	15 "	0 "
Bloomfield Lady 6912	$9\frac{3}{8}$	14 "	12 "
Nannie Fitch 9143	$9\frac{3}{8}$	14 "	4 "
Elsie Lane 13,302	$8\frac{9}{32}$	15 "	4 "
Hazen's Bess 7329	$7\frac{13}{16}$	24 "	11 "
Princess Bellworth 6801	$7\frac{13}{16}$	15 "	$10\frac{1}{2}$ "
Favorite Rajah Rex 16,153	$7\frac{13}{16}$	15 "	0 "
Lilley Rex 9852	$7\frac{13}{16}$	14 lbs.	7 oz.
Lottie Rex 18,757	$7\frac{13}{16}$	14 "	4 "
Jeannie Platt 6005	$7\frac{13}{16}$	14 "	4 "
Pet Rex 20,166	$7\frac{13}{16}$	14 "	$2\frac{1}{2}$ "
Dollie Dale 16,140	$7\frac{1}{32}$	15 "	7 "
Attractive Maid 16,925	$6\frac{1}{4}$	22 "	5 "
Gold Lace 10,726	$6\frac{1}{4}$	21 "	1 "
Kitty Potter 9893	$6\frac{1}{4}$	18 "	5 "
Medrena 3939	$6\frac{1}{4}$	18 "	4 "
Mirth's Blanche 19,572	$6\frac{1}{4}$	17 "	$13\frac{1}{2}$ "
Abbie Z. 3d 14,742	$6\frac{1}{4}$	17 "	0 "
Golden Skin 10,861	$6\frac{1}{4}$	16 "	8 "
Sister Rex 13,194	$6\frac{1}{4}$	16 "	8 "
Polynia 10,753	$6\frac{1}{4}$	16 "	7 "
Pride of Corisande 5323	$6\frac{1}{4}$	16 "	0 "
Rosabel Hudson 5704	$6\frac{1}{4}$	15 "	12 "
Myrtle 2d 211	$6\frac{1}{4}$	15 "	12 "
Cascadilla 3103	$6\frac{1}{4}$	15 "	12 "
Ultima 14,456	$6\frac{1}{4}$	15 "	12 "
Grandiflora 9953	$6\frac{1}{4}$	15 "	8 "
Usilda 2d 6157	$6\frac{1}{4}$	15 "	$2\frac{1}{2}$ "
Rosy Dream 9808	$6\frac{1}{4}$	14 "	13 "
Duchess of Argyle 3758	$6\frac{1}{4}$	14 "	13 "
Pansy K. 23,889	$6\frac{1}{4}$	14 "	9 "
Kate Daisy 8204	$6\frac{1}{4}$	14 "	4 "
Gem of Sassafras 8434	$6\frac{1}{4}$	14 "	$3\frac{1}{2}$ "
Lucy Gaines Buttercup 5058	$6\frac{1}{4}$	14 "	0 "
Chautauqua Queen 26,403	$5\frac{17}{32}$	14 "	11 "
Fall Leaf 8587	$5\frac{17}{32}$	14 "	8 "
Mollie Garfield 12,172	$4\frac{11}{16}$	22 "	12 "
Lara 4306	$4\frac{11}{16}$	17 "	8 "
Renalba 4117	$4\frac{11}{16}$	17 "	$4\frac{1}{2}$ "
Flora Lee of Tennessee 7649	$4\frac{11}{16}$	16 "	5 "
Mary Hinman 17,619	$4\frac{11}{16}$	15 "	$11\frac{1}{2}$ "
Arawana Poppy 6053	$4\frac{11}{16}$	15 "	2 "
Bellini's Maid 15,170	$4\frac{11}{16}$	15 "	$1\frac{1}{2}$ "
Bellini La Biche 15,091	$4\frac{11}{16}$	14 "	$14\frac{1}{2}$ "
Magnibel 7976	$4\frac{11}{16}$	14 "	12 "
Adina 1942	$4\frac{11}{16}$	14 "	4 "
Rosy Kate's Rex 13,192	$3\frac{29}{32}$	18 "	8 "
Herberta 8811	$3\frac{29}{32}$	16 "	15 "
VALUE 2d 6844	$3\frac{1}{8}$	**25** "	**$2\frac{11}{12}$** "
Queen Mary of Woodlawn 11,659	$3\frac{1}{8}$	22 "	5 "
Colt's La Biche 6399	$3\frac{1}{3}$	17 "	$2\frac{1}{2}$ "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Lizzie D. 10,408	$3\frac{1}{8}$	16	lbs.	15	oz.
Pride of Mashamoquet Farm 6469	$3\frac{1}{8}$	16	"	$1\frac{3}{4}$	"
Lady Alice of the Wilderness 12,207	$3\frac{1}{8}$	15	"	14	"
Tobira 8400	$3\frac{1}{8}$	15	"	13	"
Roll of Honor 13,610	$3\frac{1}{8}$	14	"	12	"
Maud Lee 2d 8839	$3\frac{1}{8}$	14	"	9	"
Monocacy Dimple 9680	$3\frac{1}{8}$	14	"	3	"
Miami Prize 8100	$3\frac{1}{8}$	14	"	0	"
Ethalka 2d 14,128	$2\frac{47}{64}$	15	"	0	"
Sister Cash 33,987	$6\frac{1}{4}$	14	"	10	"
Milkmaid Felch 12,339	$2\frac{27}{32}$	16	lbs.	$7\frac{1}{2}$	oz.
Alice Donald ——	$2\frac{27}{32}$	14	"	0	"
Clover Bloom 9783	$2\frac{11}{32}$	14	"	$14\frac{1}{2}$	"
Belle of Uwchland 8468	$2\frac{11}{32}$	14	"	7	"
Duchess of Manchester 20,832	$2\frac{11}{32}$	14	"	0	"
Clover Mel 16,159	$1\frac{47}{64}$	14	"	9	"
Medrie Le Brocq 8888	$1\frac{9}{16}$	14	"	7	"
Marpetra 10,284	$1\frac{9}{16}$	14	"	6	"
Eva of Snipsic 17,650	$1\frac{9}{16}$	14	"	1	"

Total, 105 *cows.*

PRINCE 55.

Color, light fawn and white. Dropped 1856. Bred by W. C. Wilson. Sire, Commodore 56. Dam, Duchess 82.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Grace 2d 919	50	20	lbs.	0	oz.
Oxalis 606	50	15	"	0	"
Reckless 3569	$37\frac{1}{2}$	17	"	8	"
Memento 1913	$37\frac{1}{2}$	14	"	5	"
Haddie 921	25	16	"	0	"
Oxalis 2d 15,631	25	15	"	0	"
Mirth's Blanche 19,592	$18\frac{3}{4}$	17	"	$13\frac{1}{2}$	"
Allie Minka 15,562	$18\frac{3}{4}$	14	"	$6\frac{1}{2}$	"
Cigarette 2849	$18\frac{3}{4}$	14	"	4	"
Muezzin 3670	$18\frac{3}{4}$	14	"	0	"
Rosaline of Glenmore 3179	$12\frac{1}{2}$	17	"	10	"
Embla 4799	$12\frac{1}{2}$	17	"	8	"
Maggie May 2d 12,926	$12\frac{1}{2}$	14	"	6	"
Naomi Cramer 8628	$12\frac{1}{2}$	14	"	0	"
Bonnie Yost 7943	$9\frac{3}{8}$	18	"	2	"
Grandiflora 9953	$9\frac{3}{8}$	15	lbs.	8	oz.
Ada Minka 15,562	$9\frac{3}{8}$	14	"	0	"
Nan Day 17,192	$7\frac{1}{32}$	20	"	4	"
Mary M. Allison 6308	$6\frac{1}{4}$	20	"	14	"
Belle of Prospect 2d 14,326	$6\frac{1}{4}$	19	"	0	"
Florinanna 9862	$6\frac{1}{4}$	17	"	5	"
Rose of Rose Lawn 9365	$6\frac{1}{4}$	16	"	3	"
Urbana 5597	$6\frac{1}{4}$	16	"	0	"
Merry Burlington 7600	$6\frac{1}{4}$	15	"	4	"
Dark Cloud 9364	$6\frac{1}{4}$	15	"	$3\frac{1}{2}$	"
Embla Brick 15,690	$6\frac{1}{4}$	14	"	3	"
PET OF ROSE LAWN 11,326	$3\frac{1}{8}$	18	"	$2\frac{1}{2}$	"
		15	"	$8\frac{1}{2}$	"
Corn 10,504	$3\frac{1}{8}$	16	"	2	"

Total, 28 *cows.*

1858.

BULLS.

PILOT 3.

Color, fawn, with little white. Dropped on ship Stalwart, May 2d, 1858. Imported by William F. Potts, June, 1858.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Silver Rose 4753	25	16 lbs.	14 oz.
Thisbe 607	25	15 "	12 "
Adina 1942	25	14 "	4 "
Beauty ——	18¾	20 "	15 "
Renalba 4117	18¾	17 "	4½ "
Leoni 11,868	12½	18 "	7 "
Thisbe 2d 2201	12½	19 "	1½ "
Creole Maid 11,017	12½	16 "	15 "
Chamomilla 7552	12½	16 "	10 "
Linda 3d 3219	12½	16 "	8 "
Flora Lee of Tennessee 7694	12½	16 "	5 "
Lutea 4563	12½	16 "	3 "
Belle of Vermilion 8798	12½	15 "	14 "
Romp Ogden 3d 4764	12½	15 "	5 "
Kalmia 4561	12½	15 "	0 "
Opaline 7590	12½	14 "	10 "
Pixie 4115	12½	14 "	0 "
Elmora Mostar 15,955	12½	14 "	0 "
Dollie Dale 16,140	9⅜	15 "	7 "
Alice Donald ——	7 13/16	14 "	0 "
Mollie Garfield 12,172	6¼	22 "	12 "
Mary M. Allison 6308	6¼	20 "	14 "
Roonan 5133	6¼	20 "	4 "
Belle of Prospect 2d 14,326	6¼	19 "	0 "
Harmony 2d 17,118	6¼	18 "	3 "
Bonnie Yost 7943	6¼	18 "	2 "
Kaoli 18,980	6¼	17 "	8 "
Safrano 4568	6¼	17 "	8 "
Cerita of Meadowbrook 5056	6¼	17 "	8 "
Mhoon Lady, 6560	6¼	17 "	3 "
Princess Mostar 9700	6¼	17 "	3 "
Dudu of Linwood 8336	6¼	16 "	15 "
Auria 4567	6¼	16 "	13 "
Pattie Mc 3d 4754	6¼	16 "	8 "
Gossip 6165	6¼	16 "	7 "
Urbana 5597	6¼	16 "	0 "
Fleurette of Linwood 12,918	6¼	16 "	0 "
Kate Gordon 8387	6¼	15 "	15 "
Zoe Henry 6693	6¼	15 "	14¾ "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Mary Hinman 17,619	6¼	15 lbs.	11½ oz.
Petite Mère 8516	6¼	15 "	13 "
Cenie Wallace 2d 6557	6¼	15 "	4½ "
Bellini's Maid 15,170	6¼	15 "	1½ "
Winsome of Ipswich 9213	6¼	15 "	0 "
Clover Bloom 9788	6¼	14 "	14½ "
Bellini La Biche 15,091	6¼	14 "	14½ "
Florry Keep 6556	6¼	14 "	14 "
Magnibel 7976	6¼	14 "	12 "
Charmer 4771	6¼	14 "	12 "
Mountain Lass 12,921	6¼	14 "	9 "
Epigæa 4631	6¼	14 "	7 "
Susie La Biche 3d 15,171	6¼	14 "	6½ "
Jaquenetta 10,958	6¼	14 "	6 "
Gem of Sassafras 8434	6¼	14 "	3½ "
Bintana 9837	6¼	14 "	3½ "
Lillian Mostar 10,364	6¼	14 "	3 "
Lucetta 6856	6¼	14 "	3 "
Queen of Prospect 11,997	6¼	14 "	2 "
Bathsheba 2556	6¼	14 "	1 "
Elmora Mostar 15,955	6¼	14 "	0 "
Erith 4564	6¼	14 "	0 "
Scituate of Woronoco 18,040	3⅛	24 "	14 "
Hazen's Nora 4791	3⅛	20 "	4 "
Jennette Montgomery 5177	3⅛	20 "	0 "
Volie 19,465	3⅛	18 "	1 "
TETTE 20,802	3⅛	**17** "	6 "
Daisy Brown 12,213	3⅛	17 "	6 "
Dot Buttercup 16,358	3⅛	16 "	2 "
Arawana Buttercup 6052	3⅛	15 "	5 "
Calypris 5643	3⅛	15 "	0 "
Dora Doon 12,909	3⅛	15 "	0 "
Fall Leaf 8587	3⅛	14 "	8 "
Violet of Glencairn 10,221	3⅛	14 "	4 "
Adora 18,569	3⅛	14 "	3 "
Taglioni 9182	3⅛	14 "	1 "
Duchess of Manchester 20,838	3⅛	14 "	0 "

Total, 76 *cows*.

PATERSON 11.

Color, yellow and white. Dropped 1858. Bred by heirs of R. L. Colt, Paterson, N. J.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Cowslip 5th 849	50	15	lbs.	4	oz.
Blanche 594	25	16	"	0	"
VALUE 2d 6844	21⅞	**25**	"	**2 11/12**	"
Chroma 4572	18¾	20	"	6	"
Vixen 7591	12½	17	"	6	"
Oktibbeha Duchess 4422	12½	17	"	4	"
Lucky Belle 2d 6037	12½	16	"	14	"
Ianthe 8562	12½	16	"	10	"
Maggie May 3255	12½	14	"	2½	"
Sue Gallagher 15,945	9⅜	23	"	1½	"
Geranium 2d 7838	6¼	26	"	4¾	"
Fadette of Verna 3d 11,122	6¼	22	"	8½	"
Tenella 6712	6¼	22	"	1½	"
Croton Maid 5305	6¼	21	"	11½	"
Optima 6715	6¼	21	"	8½	"
Fairy of Verna 2d 10,973	6¼	20	"	3¾	"
Leoni 11,868	6¼	18	"	7	"
Rooman 5133	6¼	18	"	2	"
Jersey Cream 3151	6¼	17	"	0	"
Silver Rose 4753	6¼	16	"	14	"
Valhalla 5300	6¼	17	"	0	"
Kate Gordon 8387	6¼	15	"	15	"
Œnone 8614	6¼	15	"	14	"
Zithey 9184	6¼	16	"	7	"
Valerie 6044	6¼	15	"	13	"
Belle of Patterson 5664	6¼	16	"	6	"
Edwina 6713	6¼	15	"	13	"
Urbana 5597	6¼	16	"	0	"
Fanny Faylor 6714	6¼	15	"	12	"
Signalana 7719	6¼	15	"	4	"
Aldarine 5301	6¼	15	"	1½	"
Arnold's Lulu 7328	6¼	15	"	0	"
Olie 4133	6¼	15	"	0	"
Cowles' Nonsuch 6199	6¼	14	"	12	"
Pansy K 23,889	6¼	14	"	9	"
Maggie May 2d 12,926	6¼	14	"	6	"
Maggie C. 12,216	6¼	14	"	6	"
Kate Daisy 8204	6¼	14	"	4	"
Litza 6338	6¼	14	"	3	"
Creamer 2467	6¼	14	"	1	"
Variella of Linwood 10,954	6¼	14	"	1	"
Pixie 4115	6¼	14	"	0	"
Guinevere Sinclair 11,167	4 11/16	14	lbs.	9	oz.
Daisy Hamilton 18,301	4 11/16	14	"	0	"
Lady Mel 2d 1795	3⅛	21	"	0	"
Celeste Cox 12,948	3⅛	20	"	8	"
Hilda A. 2d 11,120	3⅛	20	"	0	"
Gardiner's Ripple 11,693	3⅛	19	"	12½	"
EVELINA OF VERNA 10,971	3⅛	**19**	"	**10½**	"
Tenella 2d 19,521	3⅛	18	"	12	"
Harmony 2d 17,118	3⅛	18	"	3	"
Signaldella 24,107	3⅛	18	"	1⅝	"
Reckless 3569	3⅛	17	"	8	"
Pattie Mc 3d 4754	3⅛	16	"	8	"
Celeste Cox 12,948	3⅛	16	"	4	"
Gazella 3d 9355	3⅛	16	"	3	"
(Dahlia) ——	3⅛	16	"	0	"
Rupertina 10,409	3⅛	15	"	12½	"
Ultima 14,456	3⅛	15	"	12	"
Friz Cam 14,655	3⅛	15	"	7	"
Sultana 2d 11,798	3⅛	15	"	4	"
Bronze Leaf 14,902	3⅛	15	"	1	"
Signal Maid 19,361	3⅛	15	"	0	"
Earl Cow ——	3⅛	15	"	0	"
Olie 4133	3⅛	15	"	0	"
Duchess of Argyle 3758	3⅛	14	"	13	"
Jersey Cream 2d 8519	3⅛	14	"	12	"
Reception 3d 11,025	3⅛	14	"	10	"
Euphorbia 11,229	3⅛	14	"	9¾	"
Lady Clarendon 3d 17,578	3⅛	14	"	5½	"
Gem of Sassafras 8434	3⅛	14	"	3½	"
Signetilia 16,333	3⅛	14	"	3	"
Fall Leaf 8587	2 11/16	14	"	8	"
Atlanta's Beauty 12,949	1 9/16	21	"	3	"
Alberta Signal 18,611	1 9/16	20	"	11	"
Polly Clover 7052	1 9/16	16	"	15	"
Olie's Lady Teazle 12,307	1 9/16	16	"	5	"
Pansy Patterson 18,612	1 9/16	15	"	15	"
Orphean 4636	1 9/17	15	"	7	"
Clover Bloom 9788	1 9/16	14	"	64½	"
Lady Gray of Hilltop 3d 14,642	1 9/16	14	"	2	"

Total, 81 *cows*.

COMUS 54.

Color, French gray; black nose, black around eyes. Imported in dam Diana 77, by John A. Taintor, Hartford, for John Ridgely, of Hampton, Baltimore County, Md. Dropped May 3d, 1858.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Plenty 950	50	14 lbs.	8 oz.
Eugenie Chouteau 6186	$34\frac{3}{8}$	24 "	8 "
Lillie Pope 8589	$34\frac{3}{8}$	14 "	5 "
Zampa 2194	25	18 "	0 "
Haddie 921	25	16 "	0 "
Allie Minka 2982	25	14 "	$6\frac{1}{2}$ "
Turquoise 1129	25	14 "	3 "
Nellie 1507	25	14 "	2 "
Mother Carey 11,746	$21\frac{7}{8}$	27 "	$1\frac{1}{2}$ "
Jessie Lee of Labyrinth 5290	$12\frac{1}{2}$	14 "	7 "
Sunset of Pleasant View 13,071	$13\frac{9}{32}$	15 "	2 "
Beulah of Baltimore 3270	$12\frac{1}{2}$	14 "	$6\frac{1}{2}$ "
Buttery 3502	$12\frac{1}{2}$	14 "	1 "
Queen of De Soto 12,318	$9\frac{3}{8}$	14 "	13 "
Putnam Belle 12,116	$9\frac{3}{8}$	14 "	0 "
Valma Hoffman 4500	$6\frac{1}{4}$	21 "	0 "
The Widow's Daughter 11,507	$6\frac{1}{4}$	19 "	$8\frac{1}{2}$ "
Harmony 2d 17,118	$6\frac{1}{4}$	18 "	3 "
Conover's Beauty 12,650	$6\frac{1}{4}$	18 "	0 "
Cyrene 4th 480	$6\frac{1}{4}$	17 "	1 "
Lady Josephine 11,560	$6\frac{1}{4}$	16 "	$11\frac{3}{4}$ "
Ochra 2d 11,816	$6\frac{1}{4}$	16 "	$6\frac{1}{2}$ "
Cornucopia 3414	$6\frac{1}{4}$	15 lbs.	12 oz.
Naomi's Pride 16,745	$6\frac{1}{4}$	15 "	2 "
Bessie Ridgely 8293	$6\frac{1}{4}$	14 "	$11\frac{1}{2}$ "
Celia Belle 5865	$6\frac{1}{4}$	14 "	3 "
Ada Minka 15,562	$6\frac{1}{4}$	14 "	0 "
Mary Norton 13,052	$6\frac{1}{4}$	17 "	14 "
Miami Prize 8100	$6\frac{1}{4}$	14 "	0 "
Alberta Signal 18,611	$4\frac{11}{16}$	20 "	11 "
Cerita of Meadowbrook 5056	$3\frac{1}{8}$	17 "	8 "
Maudine of Elmwood 8718	$3\frac{1}{8}$	16 "	15 "
Pattie Mc 3d 4754	$3\frac{1}{8}$	16 "	8 "
Lily of Maple Grove 5079	$3\frac{1}{8}$	16 "	3 "
Dot Buttercup 16,358	$3\frac{1}{8}$	16 "	2 "
Gledelia 10,524	$3\frac{1}{8}$	15 "	12 "
Fancy Juno 6086	$3\frac{1}{8}$	15 "	10 "
Oitz 8649	$3\frac{1}{8}$	15 "	1 "
Alice of the Meadows 20,748	$3\frac{1}{8}$	14 "	12 "
Gold Princess 8809	$3\frac{1}{8}$	14 "	12 "
Halsie McCurdy 12,379	$3\frac{1}{8}$	14 "	$3\frac{1}{2}$ "
Litza 6338	$3\frac{1}{8}$	14 "	3 "
Pixie 4115	$3\frac{1}{8}$	14 "	0 "
Rose of Rose Lawn 9365	$1\frac{9}{16}$	16 "	3 "
Dark Cloud 9364	$1\frac{9}{16}$	15 "	$3\frac{1}{2}$ "
Total, 45 cows.			

1859.

BULLS.

DICK SWIVELLER JR. 276.

Color, fawn and white. Bred by B. D. Godfrey, Milford, Mass. Dropped April, 1859.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Countess of Lakeside 12,135	75	19 lbs.	7 oz.
Jersey 3260	50	15 "	6 "
Minnie of Scituate 17,829	$40\frac{5}{8}$	14 "	$4\frac{1}{2}$ "
Jersey Belle of Scituate 7828	$37\frac{1}{2}$	25 lbs.	3 oz.
Eupidee's Perfection 20,175	$37\frac{1}{2}$	15 "	4 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Clara of Lakeside 10,827	25	15 lbs.	0 oz.
Dolly of Lakeside 10,824	25	14 "	8 "
Gilda 2779	25	14 "	6 "
Belle of Scituate 7977 . .	18¾	18 "	0 "
Pauline's Vivienne 11,305	18¾	16 "	13 "
Lass of Scituate 9555 . .	18¾	15 "	14 "
Jersey Queen of Barnet —— 851 lbs. 1 oz. in one year	12½	19 "	4 "
Lily of Burr Oaks 11,011 .	12½	15 "	13 "
Scituate of Woronoco 18,040	12½	24 "	14 "
Lily Scituate 12,665 . .	9⅜	24 lbs.	9½ oz.
Effie ——	6¼	23 "	2 "
Jenny Dodo H. 14,448 . .	6¼	21 "	8 "
Roland's Bonnie 2d 18,054	6¼	19 "	2 "
Dove Dee 18,059 . . .	6¼	15 "	3 "
Snowdrop F. W. 16,948 .	6¼	14 "	8 "
Eva ——	6¼	14 "	0 "
Nan Day 17,192	$4\frac{11}{16}$	20 "	4 "

Total, 22 *cows*.

COWS.

PRINCESS 836.

Color, dark fawn. Dropped 1859. Imported 1861, from Jersey, by H. Kuhn.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Wybie 595	75	17 lbs.	4 oz.
Chenie 4570	37½	19 "	7½ "
Thisbe 607	37½	15 "	10 "
Thisbe 2d 2201	18¾	19 "	1½ "
Chamomilla 7552 . . .	18¾	16 "	10 "
Ma Belle 4942	18¾	15 "	0 "
Adina 1942	18¾	14 "	4 "
Belle of Ogden Farm 1570	12½	14 "	0 "
Princess Mostar 9700 . .	9⅜	17 "	3 "
Lillian Mostar 10,364 . .	9⅜	14 "	3 "
Elmora Mostar 15,955 . .	9⅜	14 "	0 "
Mamie Coburn 3798 . .	6¼	18 "	4 "
Rose of Hillside 3866 . .	6¼	14 "	3½ "
Maggie May 3255 . . .	6¼	14 "	2½ "
Gilt Edge 2d 4420 . . .	6¼	14 "	0 "
Maculac 24,277	$4\frac{11}{16}$	15 "	3 "
Hazen's Nora 4791 . . .	3⅛	20 "	4 "
Rosebud of Allerton 6352	3⅛	19 "	12 "
Marea 10,167	3⅛	17 "	10 "
Lucky Belle 2d 6037 . .	3⅛	16 lbs.	14 oz.
Gossip 6165	3⅛	16 "	7 "
Julia Evelyn 6007 . . .	3⅛	15 "	15½ "
GILT EDGE C. 12,223 .	3⅛	**15** "	**9½** "
Valerie 6044	3⅛	15 "	13 "
Duchess Caroline 3d 6041 .	3⅛	15 "	8 "
Arawana Buttercup 6052 .	3⅛	15 "	5 "
Arawana Poppy 6053 . .	3⅛	15 "	2 "
Bettie Dixon 4527 . . .	3⅛	15 "	0 "
Florry Keep 6556 . . .	3⅛	14 "	14 "
Coronilla 8367	3⅛	14 "	9½ "
Pride of the Hill 4877 . .	3⅛	14 "	8 "
Maggie May 2d 12,926 . .	3⅛	14 "	6 "
Maggie C. 12,216 . . .	3⅛	14 "	6 "
Flamant 11,270	3⅛	14 "	2 "
Minnie Lee 2d 6009 . . .	3⅛	14 "	3 "
Starkville Beauty 4897 . .	3⅛	14 "	0 "

Total, 36 *cows*.

1860.

BULLS.

SIR CHARLES 131.

Imported 1860, from Prince Albert's Shaw Farm, Windsor, England, by Commodore R. F. Stockton, New Jersey. (Age not given.)

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Monmouth Duchess 4th 7129	62½	18 lbs.	0 oz.
Tamy 2d 7125	62½	16 "	4 "
Monmouth Duchess 3d 4620	62½	14 "	7 "
Violet 272	50	17 "	8 "
Carrie 3894	50	16 "	8 "
Warren's Duchess 4622	50	16 "	1 "
Tamy 3d 7127	31¼	16 "	0 "
Dot of Bear Lake 6170	25	19 "	4 "
Princess Imperial 11,620	25	18 "	15 "
Mary of Bear Lake 6171	25	15 "	14 "
My Queen 12,614	25	15 "	8 "
Monmouth Duchess 3895	25	14 lbs.	7 oz.
Countess of Warren 3896	25	14 "	0 "
Lady Conover 2d 17,589	15⅝	20 "	0 "
Tamy Lowndes 25,316	15⅝	16 "	2 "
Countess Lowndes 26,874	12½	17 "	8 "
Lady Warren 12,168	12½	16 "	7 "
Ida of Bear Lake 6169	12½	16 "	0 "
Mary's Silver Drop 14,325	12½	15 "	4½ "
Duchess of Dudley 8670	12½	15 "	0 "
Lena Lowndes 23,202	12½	14 "	7 "
Niobe's Alpheanette 23,336	6¼	22 "	10½ "

Total, 22 cows.

COWS.

MARY LOWNDES 273.

Imported in autumn of 1860, from Prince Albert's Shaw Farm, Windsor, England, by Commodore R. F. Stockton, New Jersey. (Age not given.)

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Violet 272	50	17 lbs.	8 oz.
Carrie 3894	50	16 "	8 "
Monmouth Duchess 4th 7129	25	18 "	0 "
Tamy 2d 7125	25	16 "	4 "
Warren's Duchess 4622	25	16 "	1 "
My Queen 12,614	25	15 "	8 "
Monmouth Duchess 3895	25	14 "	7 "
Monmouth Duchess 3d 4620	25	14 "	7 "
Countess of Warren 3896	25	14 "	0 "
Dot of Bear Lake 6170	12½	19 "	4 "
Princess Imperial 11,620	12½	18 "	15 "
Lady Warren 12,168	12½	16 lbs.	7 oz.
Ida of Bear Lake 6169	12½	16 "	0 "
Tamy 3d 7127	12½	16 "	0 "
Mary of Bear Lake 6171	12½	15 "	14 "
Duchess of Dudley 8670	12½	15 "	0 "
Lena Lowndes 23,202	12½	14 "	7 "
Niobe's Alpheanette 23,336	6¼	22 "	10½ "
Lady Conover 2d 17,589	6¼	20 "	0 "
Countess Lowndes 26,874	6¼	17 "	8 "
Tamy Lowndes 25,316	6¼	16 "	2 "
Mary's Silver Drop 14,325	6¼	15 "	4½ "

Total, 22 cows.

1861.

CHARLESTON 1.

Color, fawn, dun, and white. Imported in dam Princess 836, September, 1861, by H. Kuhn. Dropped October, 1861.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Wybie 595	50	17	lbs.	4	oz.
Ma Belle 4942	37½	15	"	0	"
Adina 1942	37½	14	"	4	"
Chenie 4570	25	19	"	7½	"
Thisbe 607	25	15	"	10	"
Belle of Ogden Farm 1570	25	14	"	0	"
Thisbe 2d 2201	12½	19	"	1½	"
Mamie Coburn 3798	12½	18	"	4	"
Chamomilla 7552	12½	16	"	10	"
Rose of Hillside 3866	12½	14	"	3½	"
Maggie May 3255	12½	14	"	2½	"
Gilt Edge 2d 4420	12½	14	"	0	"
Hazen's Nora 4791	6¼	20	"	4	"
Rosebud of Allerton 6352	6¼	19	"	12	"
Marea 10,167	6¼	17	"	10	"
Princess Mostar 9700	6¼	17	"	3	"
Lucky Belle 2d 6037	6¼	16	"	14	"
Emma Hudson 12,469	6¼	16	"	8	"
Gossip 6165	6¼	16	"	7	"
Julia Evelyn 6007	6¼	15	"	15½	"
Valerie 6044	6¼	15	"	13	"
GILT EDGE C. 12,223	6¼	15	"	9½	"
Duchess Caroline 3d 6041	6¼	15	"	8	"
Arawana Buttercup 6052	6¼	15	"	5	"
Arawana Poppy 6053	6¼	15	lbs.	2	oz.
Bettie Dixon 4527	6¼	15	"	0	"
Florry Keep 6556	6¼	14	"	14	"
Coronilla 8367	6¼	14	"	9½	"
Pride of the Hill 4877	6¼	14	"	8	"
Maggie May 2d 12,926	6¼	14	"	6	"
Maggie C. 12,216	6¼	14	"	6	"
Minnie Lee 2d 6009	6¼	14	"	3	"
Lillian Mostar 10,364	6¼	14	"	3	"
Flamant 11,270	6¼	14	"	2	"
Elmora Mostar 15,955	6¼	14	"	0	"
Starkville Beauty 4897	6¼	14	"	0	"
Vivalia 12,760	6¼	14	"	0	"
Little Han 8004	6¼	14	"	0	"
Atlanta's Beauty 12,949	3⅛	21	"	3	"
Gabrielle Champion 14,102	3⅛	17	"	8	"
Armon 10,862	3⅛	16	"	13½	"
Maculac 24,277	3⅛	15	"	3	"
Mountain Lass 12,921	3⅛	14	"	9	"
Marpetra 10,284	3⅛	14	"	6	"
Therese M. 8364	3⅛	14	"	2	"
Le Rosa 10,078	3⅛	14	"	0	"

Total, 46 *cows.*

1862.

BULLS.

McCLELLAN 25.

Color, French gray, black muzzle. Bred by William Redmond, Connecticut. Dropped January 27th, 1862.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Pansy 1019 (rated)	37½	20	lbs.	0	oz.
574½ lbs. in one year.					
Champion's Chloe 12,225	34⅜	15	"	5½	"
Lady Mel 2d 1795	25	21	"	0	"
Lady Brown 433	25	14	lbs.	0	oz.
Ethalka 2d 14,128	22 21/32	15	"	0	"
VALUE 2d 6844	18¾	**25**	"	**2 11/12**	"
Maggie 3d 3221	15⅝	17	"	8	"

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Louvie 3d 6159	15⅝	14	lbs.	12	oz.
Maggie May 2d 12,926	15⅝	14	"	6	"
Maggie C. 12,216	15⅝	14	"	6	"
Webster's Pet 4103	15⅝	14	"	2	"
Peggy Leah 3097	12½	18	"	12	"
Kitty Potter 9893	12½	18	"	5	"
Dimple 3248	12½	16	"	11	"
Cascadilla 3103	12½	15	"	12	"
Arawana Queen 5368	12½	15	"	9	"
Romp Ogden 2d 4764	12½	15	"	5	"
Mary Clover 9998	12½	14	"	15	"
Lady Brown 4th 6911	12½	14	"	12	"
Bloomfield Lady 6912	12½	14	"	12	"
Lilley Rex 9852	12½	14	"	7	"
Halsie McCurdy 12,379	12½	14	"	3½	"
May Blossom 5657	9⅜	18	"	11	"
Gabrielle Champion 14,102	9⅜	17	"	8	"
Silveretta 6852	9⅜	16	"	9	"
Princess Sheila 7279	9⅜	16	"	4½	"
Tobira 8400	9⅜	15	"	13	"
GILT EDGE C. 12,223	9⅜	**15**	"	**9½**	"
Marie C. Magnet 22,903	9⅜	15	"	0½	"
Coronilla 8367	9⅜	14	"	9½	"
Guinevere Sinclair 11,167	9⅜	14	"	9	"
Maggie May 2d 12,926	9⅜	14	"	6	"
Lady Greville 12,930	9⅜	14	"	6	"
Maggie C. 12,216	9⅜	14	"	3	"
Minnie Lee 2d 12,941	9⅜	14	"	3	"
Webster's Pet 4103	9⅜	14	"	2	"
Therese M. 8364	9⅜	14	"	2	"
Jessie Leavenworth 8248	9⅜	14	lbs.	2	oz.
Jersey Cream 3151	6¼	17	"	0	"
Ultima 14,456	6¼	15	"	12	"
Forget-Me-Not-O 10,564	6¼	15	"	4	"
Olie 4133	6¼	15	"	0	"
Mary Clover 9998	6¼	14	"	15	"
Deborana 4718	6¼	14	"	8	"
La Pera 2d 13,404	6¼	14	"	8	"
Creamer 12,467	6¼	14	"	1	"
Romp Ogden 3d 5458	6¼	14	"	1	"
Fall Leaf 8587	$5\frac{17}{32}$	14	"	8	"
Polly Clover 7052	$4\frac{11}{16}$	16	"	15	"
Pet Clover 14,624	$4\frac{11}{16}$	16	"	8	"
Alhena 15,995	$4\frac{11}{16}$	16	"	3	"
Lady Gray of Hilltop 2d 14,641	$4\frac{11}{16}$	14	"	12	"
Lady Gray of Hilltop 3d 14,642	$4\frac{11}{16}$	14	"	2	"
Baby Buttercup 10,888	$4\frac{11}{16}$	14	"	0	"
Celeste Cox 12,948	$3\frac{15}{64}$	20	"	8	"
Hazen's Bess 7329	3⅛	24	"	11	"
Hazen's Nora 4791	3⅛	20	"	4	"
Œnone 8614	3⅛	18	"	15	"
Alfleda 6744	3⅛	16	"	5	"
Pansy Patterson 18,612	3⅛	15	"	15	"
Frances C. Magnet 22,904	3⅛	14	"	13½	"
Jersey Cream 2d 8519	3⅛	14	"	12	"
Gem of Sassafras 8434	3⅛	14	"	3½	"

Total, 63 cows.

ROXBURY 247.

Color, fawn upon back and sides, shading into gray and black. Dropped 1862. Bred by Jonathan French, Massachusetts. Sire, Commodore 229. Dam, Rose 709.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Angela 1682	50	14	lbs.	2	oz.
Belle Dawson 8270	37½	18	"	3	"
Pattie Mc 3d 4754	37½	16	"	8	"
Duchess of Bloomfield 3653	25	20	"	0½	"
SU LU 4705	25	**17**	"	**15**	"
Vixen 7591	25	17	"	6	"
Letitia 3977	25	15	"	5	"
Bathsheba 2556	25	14	"	1	"
Urbana 5597	18¾	16	"	0	"
Lucetta 6856	18¾	14	"	3	"
Roonan 5133	12½	20	lbs.	4	oz.
Lara 4306	12½	17	"	8	"
Kate Gordon 8387	12½	15	"	15	"
Lorella 12,913	12½	14	"	7	"
Litza 6338	12½	14	"	3	"
Variella of Linwood 10,954	12½	14	"	1	"
Pixie 4115	12½	14	"	0	"
ETHLEEL 2d 32,291	6¼	**30**	"	**15**	"
Jennette Montgomery 5177	6¼	20	"	0	"
Bonnie Yost 7943	6¼	18	"	2	"

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Leoni 11,868	6¼	18 lbs. 2 oz.
Dudu of Linwood 8336	6¼	16 " 15 "
Silenta 17,685	6¼	15 " 10 "
Fall Leaf 8587	6¼	14 " 8 "
Epigæa 4631	6¼	14 " 7 "
Jaquenetta 10,958	6¼	14 " 6 "
Adora 18,509	6¼	14 lbs. 3 oz.
Silene 4307	6¼	14 " 0 "
Jule 3640	6¼	14 " 0 "
Lady of Otsego, 26,671	6¼	14 " 0 "
Putnam Belle 12,116	6¼	14 " 0 "
Total, 31 *cows*.		

COWS.

PANSY 6th 38.

Color, light silver fawn; silver white saddle on withers. Bred by John T. Norton, Farmington, Conn. Dropped February 16th, 1862. Sire, Paterson 11. Dam, Pansy 8.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Oktibbeha Duchess 4422	25	17 lbs. 4 oz.
Lucky Belle 2d 6037	25	16 " 14 "
Maggie May 3255	25	14 " 2½ "
Maggie 3d 3221	18¾	17 " 8 "
Geranium 2d 7838	12½	26 " 4¾ "
Tenella 6712	12½	22 " 1½ "
Croton Maid 5305	12½	21 " 11½ "
Optima 6715	12½	21 " 8½ "
Œnone 8614	12½	18 " 15 "
Valhalla 5300	12½	17 " 0 "
Jersey Cream 3151	12½	17 " 0 "
Belle of Patterson 5664	12½	16 " 6 "
Edwina 6713	12½	15 " 13 "
Valerie 6044	12½	15 " 13 "
Fanny Taylor 6714	12½	15 " 13 "
Signalana 7719	12½	15 " 12 "
Aldarine 5301	12½	15 " 1½ "
Maggie C. 12,216	12½	14 " 6 "
Maggie May 2d 12,926	12½	14 " 6 "
Creamer 2467	12½	14 " 1 "
Guinevere Sinclair 11,167	9⅜	14 " 9 "
VALUE 2d 6844	6¼	**25** " **2 11/12** "
Fadette of Verna 3d 11,122	6¼	22 " 8½ "
Atlanta's Beauty 12,949	6¼	21 " 3 "
Lady Mel 2d 1795	6¼	21 " 0 "
Celeste Cox 12,948	6¼	20 " 8 "
Fairy of Verna 2d 10,793	6¼	20 " 3¾ "
Hilda A. 2d 11,120	6¼	20 " 0 "
Gardiner's Ripple 11,693	6¼	19 " 12½ "
EVELINA OF VERNA 10,971	6¼	**19** " **10½** "
Tenella 2d 19,521	6¼	18 " 12 "
May Blossom 5657	6¼	18 " 11 "
Harmony 2d 17,118	6¼	18 lbs. 3 oz.
Signaldella 24,107	6¼	18 " 1¾ "
TETTE 20,802	6¼	**17** " **6** "
Gazella 3d 9355	6¼	16 " 3 "
Pansy Patterson 18,612	6¼	15 " 15 "
Rupertina 10,409	6¼	15 " 12½ "
Ultima 14,456	6¼	15 " 12 "
Friz Cam 14,655	6¼	15 " 7 "
Signal Maid 19,361	6¼	15 " 0 "
Olie 4133	6¼	15 " 0 "
Duchess of Argyle 3758	6¼	14 " 13 "
Jersey Cream 2d 8519	6¼	14 " 12 "
Euphorbia 11,299	6¼	14 " 9⅝ "
Pansy K. 23,889	6¼	14 " 9 "
Lady Clarendon 3d 17,578	6¼	14 " 5½ "
Gem of Sassafras 8434	6¼	14 " 3½ "
Signetilia 16,333	6¼	14 " 3 "
Fall Leaf 8587	5 15/32	14 " 8 "
Alberta Signal 18,611	3⅛	20 " 11 "
Olie's Lady Teazle 12,307	3⅛	16 " 5 "
Dahlia ——	3⅛	16 " 0 "
Orphean 4636	3⅛	15 " 7 "
Bronze Leaf 14,902	3⅛	15 " 1 "
Earl Cow ——	3⅛	15 " 0 "
Clover Bloom 9788	3⅛	14 " 14½ "
Louvie 3d 6159	3⅛	14 " 13 "
Cowles' Nonsuch 6199	3⅛	14 " 12 "
Lady Gray of Hilltop 2d 14,641	3⅛	14 " 12 "
Monocacy Dimple 9680	3⅛	14 " 3 "
Lady Gray of Hilltop 3d 14,642	3⅛	14 " 2 "
Total, 62 *cows*.		

1863.

BULLS.

SAM WELLER 271.

Color, fawn, brown and white. Dropped 1863. Imported from Island of Jersey, by E. F. Bowditch, Massachusetts, August, 1864.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.		
Hilda 2d 5447	50	23 lbs.	5	oz.
HILDA D. 6683	50	21 "	2½	"
Hilda A. 2d 11,120	25	20 "	0	"
Hennie 3335	25	15 "	0	"
Masena 25,732	12½	20 "	7	"
Jersey Queen of Barnet — 851 lbs. in one year.	12½	19 lbs.	4	oz.
Lily of Burr Oaks 11,001	12½	15 "	13	"
Niva 7523	12½	15 "	8	"
Nibbette 11,625	12½	14 "	7	"
Nordheim Creamer 9758	12½	14 "	0	"
Hulla 7898	6¼	19 "	12	"
Roland's Bonnie 2d 18,054	6¼	19 "	2	"
Snowdrop F. W. 16,948	6¼	14 "	8	"

8995½ lbs. milk and 892 lbs. 2 oz. butter in one year—902 lbs. 3 oz. in one year and eleven days.

Total, 13 *cows.*

For Sam Weller type, see portrait of **HILDA D.** 6683.

COWS.

REGINA, P. 32 J. H. B.—H. C.

Color, brown and white. Dropped 1863. A noted prize-winner, taking First Prize over Jersey as a yearling, Second Prize over Jersey as a two-year-old, First Prize over Jersey in Aged Cow Class, and reputed to have made eighteen pounds of butter (Jersey weight) in seven days. Sire, Old Noble. Dam, Mignonne.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.		
Regina 4th 12,732	50	17 lbs.	13½	oz.
Regina 2d 2475	50	14 "	8	"
Chrome Skin 7881	25	20 "	10	"
Merry Duchess 13,693	25	18 "	9½	"
Sultane 2d 11,373	25	16 "	8	"
Walkyrie 5708	25	14 "	1	"
MAMELLE 20,804	12½	21 "	8¼	"
Calendine 9415	12½	20 "	5	"
TETTE 20,802	12½	17 "	6	"
Bramballetta 10,451	12½	16 "	4	"
Saragossa 22,019	12½	15 lbs.	2	oz.
Kate Pansy 15,177	12½	15 "	1	"
Regina's Guide 16,862	12½	14 "	12	"
Cosetta 15,991	12½	14 "	11	"
L'Étoile Du Nord 16,419	12½	14 "	9	"
Tale-Bearer 24,535	12½	14 "	8	"
Brown Princess 30,941	12½	14 "	8	"
Sultan's Lily 18,099	12½	14 "	0	"
Signaldella 24,107	6¼	18 "	1¾	"

Total, 19 *cows.*

ALPHEA 171.

Color, solid brown fawn; black points. Sire, Saturn 94. Dam, Rhea 166. Bred by R. M. Hoe, New York. Dropped March 11th, 1863.

Alphea made a pound of butter from six quarts of milk when yielding at the rate of one hundred and eighty quarts of milk in seven days, on grass only, as reported by Mr. George Harris, the manager of Colonel Hoe's "Brightside Farm." Consequently, a full week's test should have yielded thirty pounds of butter. The accounts of her partial tests, as kept by Mr. George Harris, have been examined with great care by Colonel M. C. Weld, and it is his conviction that the above estimate of the butter capacity of Alphea 171 is correct.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Phædra 2561	100	19	lbs.	13	oz.
Nymphæa 5141	100	18	"	7½	"
Purest 13,730	100	15	"	4	"
Clytemnestra 2455	100	15	"	3½	"
Richness 16,336	87½	17	"	5	"
Leah Darlington 13,836	87½	15	"	5½	"
Marvel 13,734	75	15	"	0	"
Smoky 13,733	75	14	"	9	"
Ideal Alphea 18,755	75	14	"	6	"
Alphea Star 16,532	75	14	"	4½	"
Alphetta 16,531	75	14	"	2½	"
Lernella 22,322	75	14	"	1½	"
Alphea Jewell 22,331	75	14	"	0	"
Reality 16,537	62½	15	"	3½	"
Renown 13,729	62½	14	"	4½	"
Bessie Bradford 7269	62½	14	"	2	"
Iola 4627	56¼	15	"	2½	"
Eurotas 2454	50	22	"	7	"
778 lbs. in one year.					
Torfrida 3596	50	17	"	6½	"
Idaletta 11,843	50	15	"	14½	"
Lerna 3634	50	15	"	12	"
Idalene 11,841	50	15	"	8½	"
Crust 4775	50	15	"	7	"
Zalma 8778	50	15	"	5	"
Forget-Me-Not O 10,564	50	15	"	4	"
Ideal 11,842	50	14	"	14½	"
Nimble 22,335	50	14	"	10	"
Hartwick Belle 7722	50	14	"	8	"
Vestina 2458	50	14	"	2	"
Ballet Girl 18,750	50	14	"	1	"
Dove Dee 18,059	43¾	15	"	3	"
Robinette 7114	43¾	14	"	1	"
BOMBA 10,330	37½	**21**	"	**11½**	"
Colie 8309	37½	18	"	4	"
Zitella 2d 11,922	37½	17	"	8½	"
Ceccola 13,608	37½	16	lbs.	13	oz.
Matilda 5th 18,068	37½	15	"	12	"
Malope 2d 11,923	37½	15	"	10	"
Eupidee's Perfection 20,175	37½	15	"	4	"
Nazli 10,327	37½	15	"	3½	"
Honey Drop 10,033	37½	14	"	0½	"
Mother Hubbard 10,331	25	24	"	1½	"
Dia 13,658	31¼	15	"	13	"
Little Torment 15,581	25	23	"	2½	"
Niobe's Alpheanette 23,336	25	22	"	10½	"
Quachette 17,091	25	19	"	11½	"
Typha 5870	25	16	"	11	"
Lass Rex Alphea 16,965	25	16	"	10¾	"
Lady Alice of Hill Crest 7450	25	16	"	3	"
Pride of Corisande 5323	25	16	"	0	"
Gray Therese 5322	25	16	"	0	"
Bessie S. 5002	25	16	"	0	"
Fillpail 16,530	25	15	"	11	"
Niva 7523	25	15	"	8	"
Darling of Neatham 20,086	25	15	"	3	"
Forsaken 7520	25	15	"	1	"
Faustine 10,354	25	14	"	14½	"
Estrella 2831	25	14	"	12	"
Belle of Uwchland 8468	25	14	"	7	"
Silversides 3857	25	14	"	3	"
St. Nick's Flora 16,195	25	14	"	0	"
Silver Belle 4313	25	14	"	0	"
Lily of Maple Grove 5079	15⅝	16	"	3	"
Princess Mostar 9700	12½	17	"	3	"
Rioter Alphea 10,091	12½	16	"	7	"
Bertha Black 26,275	12½	17	"	0	"
Corn 10,504	12½	16	"	2	"
Pansy Patterson 18,612	12½	15	"	15	"
Calpurnia 13,267	12½	15	"	3½	"
Bessie Bradford 2d 7291	12½	15	"	2	"

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Verora 10,766	12½	15 lbs.	1½ oz.
Lady Louise 4339	12½	15 "	0 "
Peggy Ford 21,713	12½	14 "	10 "
Lillian Mostar 10,364	12½	14 "	3 "
Signetilia 16,333	12½	14 "	3 "
Elmora Mostar 15,955	12½	14 "	0 "
Gilt 4th 4208	12½	14 "	0 "
Gilt Edge 2d 4420	12½	14 "	0 "
Referette 15,209	9⅜	15 "	8 "
Lizzie D. 10,408	7 13/16	16 "	15 "
Alberta Signal 18,611	6¼	20 "	11 "
Lucy Lanier 13,053	6¼	18 lbs.	2 oz.
Lida Mullin 9198	6¼	16 "	8 "
Gabrielle Champion 14,102	6¼	17 "	8 "
Corinna 2d 6594	6¼	16 "	5 "
GILT EDGE C. 12,223	6¼	**15** "	**9½** "
Leoline 2d 18,315	6¼	14 "	4 "
Sasco Bell 13,601	6¼	14 "	0 "
Bronze Leaf 14,902	3⅛	15 "	1 "
Shiloh Daughter 20,378	1 9/16	14 "	7½ "
Goldstraw 3d 14,724	6¼	14 "	12 "
Total, 91 *cows*.			

1864.

RIOTER 746 E. H B.

Color, mulberry fawn with gray saddle; black points. Dropped February, 1864. Fatted 1869. Bred by Philip Dauncey, Horwood Rectory Farm, Winslow, Bucks, England. Sire, Pedlar 631 E. H. B. Dam, Rita, imported from Jersey.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
La Petite Mère 2d 12,810	28⅛	16 lbs.	7 oz.
Eurotas 2454	25	22 "	7 "
Torfrida 3596	25	17 "	6½ "
Hebe 3d 3613	25	15 "	0 "
Rioter 2d's Venus	25	14 "	0 "
MATILDA 4th 12,816	18¾	**21** "	**8½** "
Minnie of Oxford 12,806	18¾	16 "	0 "
La Belle Petite 5472	18¾	15 "	8 "
Marjoram 2d 12,805	18¾	15 "	0 "
Mintha 12,812	14 1/16	15 "	0 "
Colie 8309	12½	18 "	4 "
Pyrrha 6100	12½	16 "	14½ "
Typha 5870	12½	16 "	11 "
Dia 13,658	12½	15 "	13 "
True Inwardness, 10,262	12½	14 "	0 "
MARY ANNE OF ST. LAMBERT 9770	9⅜	**36** "	**12½** "
IDA OF ST. LAMBERT 24,990	9⅜	**30** "	**2½** "
MERMAID OF ST. LAMBERT 9771	9⅜	**25** "	**13½** "
NAIAD OF ST. LAMBERT 12,965	9⅜	**22** "	**2½** "
Nora of St. Lambert 12,962	9⅜	22 lbs.	0 oz.
NIOBE OF ST. LAMBERT 12,969	9⅜	**21** "	**9½** "
Brenda of Elmhurst 10,762	9⅜	20 "	8 "
Honeymoon of St. Lambert 11,221	9⅜	20 "	5½ "
RIOTER PINK OF BERLIN 23,665	9⅜	**19** "	**14** "
Crocus of St. Lambert 8351	9⅜	17 "	12 "
Cowslip of St. Lambert 8349	9⅜	17 "	12 "
Minette of St. Lambert 9774	9⅜	17 "	4 "
Diana of St. Lambert 6636	9⅜	16 "	8 "
Maggie of St. Lambert 9776	9⅜	16 "	3 "
Moth of St. Lambert 9775	9⅜	16 "	2 "
Mary Hinman 17,619	9⅜	15 "	11½ "
Rioter's Nora 21,778	9⅜	15 "	9 "
Mavourneen of St. Lambert 9777	9⅜	15 "	7 "
May Day Stoke Pogis 28,353	9⅜	15 "	3 "
Cupid of Lee Farm 5997	9⅜	14 "	6 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Nancy of St. Lambert 12,964	9⅜	14	lbs.	5	oz.
Rioter's Beauty 14,894 . .	7 1/32	14	"	0	"
Mother Hubbard 10,331 .	6¼	24	"	1½	"
BOMBA 10,330	6¼	**21**	"	**11½**	"
Matilda 5th 18,068 . . .	6¼	16	"	4	"
EUPHONIA 6783 . . .	6¼	**16**	"	**0½**	"
Leah Darlington 13,836 .	6¼	15	"	5½	"
Nazli 10,327	6¼	15	"	3½	"
Nimble 22,335	6¼	14	"	10	"
Smoky 13,733	6¼	14	"	9	"
Jennie Johnson 3d 6782 .	6¼	14	"	0	"
Rose of St. Lambert 20,426	4 11/16	21	lbs.	3½	oz.
Rioter's Maggie 22,530 . .	4 11/16	18	"	6¼	"
Carrie Pogis 22,568 . . .	4 11/16	15	"	9	"
Maggie Sheldon 23,583 . .	4 11/16	15	"	3	"
Rioter's Ruth 14,882 . .	4 11/16	14	"	12	"
Daisy Morrison 14,035 . .	3⅛	25	"	12½	"
Rioter Alphea 10,091 . .	3⅛	16	"	7	"
Eupidee's Perfection 20,175	3⅛	15	"	4	"
Dove Dee 18,059	3⅛	15	"	3	"

Total, 55 cows.

LIVING STORM 173.

Color, brown, black and white. Dropped March 20th, 1864. Bred by John T. Norton, Farmington, Conn. Sire, McClellan 25. Dam, Pansy 8.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Pansy 1019	50	20	lbs.	0	oz.
574½ lbs. in one year.					
Peggy Leah 3097 . . .	25	18	"	12	"
Dimple 3248	25	16	"	11	"
Cascadilla 3103	25	15	"	12	"
Gabrielle Champion 14,102	18¾	17	"	8	"
Silveretta 6852	18¾	16	"	9	"
Princess Sheila 7279 . .	18¾	16	"	4½	"
Tobira 8400	18¾	15	"	13	"
GILT EDGE C. 12,223 .	18¾	**15**	"	**9½**	"
Marie C. Magnet 22,903 .	18¾	15	"	8	"
Champion's Chloe 12,225 .	18¾	15	"	5½	"
Dairy C. 12,227	18¾	15	"	0½	"
Mary Clover 9998 . . .	18¾	14	"	15	"
Coronilla 8367	18¾	14	"	9½	"
Maggie C. 12,216 . . .	18¾	14	"	6	"
Maggie May 2d 12,926 . .	18¾	14	"	6	"
Lady Greville 12,930 . .	18¾	14	"	6	"
Minnie Lee 2d 12,941 . .	18¾	14	"	3	"
Jessie Leavenworth 8248 .	18¾	14	"	2	"
Webster's Pet 4103 . . .	18¾	14	"	2	"
Therese M. 8364	18¾	14	"	2	"
May Blossom 5657 . . .	12½	18	"	11	"
Ethalka 2d 14,128 . . .	12½	15	lbs.	0	oz.
Deborana 4718	12½	14	"	8	"
Pet Clover 14,624 . . .	9⅜	16	"	8	"
Lady Gray of Hilltop 2d 14,641	9⅜	14	"	12	"
Bell Rex 11,700	9⅜	14	"	10	"
Chautauqua Queen 26,403	9⅜	14	"	11	"
Lilley Rex 9852	9⅜	14	"	7	"
Lady Gray of Hilltop 3d 14,642	9⅜	14	"	2	"
Hurrah Pansy 12,153 . .	9⅜	14	"	1½	"
Baby Buttercup 10,888 .	9⅜	14	"	0	"
Celeste Cox 12,948 . . .	6 15/32	20	"	8	"
Hazen's Nora 4791 . . .	6¼	20	"	4	"
Cordelia Baker 8814 . .	6¼	17	"	9	"
Polly Clover 7052 . . .	6¼	16	"	15	"
Alhena 15,995	6¼	16	"	3	"
Orphean 4636	6¼	15	"	7	"
Frances C. Magnet 22,904 .	6¼	14	"	13½	"
Cowles' Nonsuch 6199 . .	6¼	14	"	12	"
Hillside Gem 16,640 . . .	4 11/16	20	"	0	"
La Pera 2d 13,404 . . .	4 11/16	14	"	8	"

Total, 42 cows.

1865.

BLUCHER 48.

Color, dark brown. Bred at Shaw Farm, Windsor Park, England. Imported September 9th, 1865, by R. W. Cameron, Staten Island, New York.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Lilly Cross 13,796	31¼	14 lbs. 3 oz.
Golden Princess 4557	25	15 " 14 "
Myrtle 2d 211	25	15 " 12 "
Copper 1979	25	15 " 7 "
Hulla 7898	12½	19 " 12 "
Floret 9959	12½	17 " 6 "
Pride of Mashamoquet Farm 6469	12½	16 " 1¾ "
Grandiflora 9953	12½	15 " 8 "
Maud Lee 2d 8839	12½	14 " 9 "
Myrtle of Ridgewood 7858	12½	14 " 1 "
Gold Lace 10,726	6¼	21 " 1 "
Hillside Gem 16,640	6¼	20 " 0 "
Belmeda 6229	6¼	18 " 12 "
Lizzie D. 10,408	6¼	16 " 15 "
Lida Mullin 9178	6¼	16 " 8 "
Lady Bidwell 10,303	6¼	15 " 12 "
Golden Skin 10,861	6¼	16 " 8 "
Elsie Lane 13,302	6¼	15 " 12 "
Canto 7194	6¼	15 " 12 "
Elsie Lane 13,302	6¼	15 " 4 "
Little Sister 11,666	6¼	14 lbs. 12 oz.
Pawtucket Belle 12,406	6¼	14 " 12 "
Lady Ives 3d 6740	6¼	14 " 8 "
Shiloh Daughter 20,378	6¼	14 " 7½ "
Kate Daisy 8204	6¼	14 " 4 "
Lucy Gaines Buttercup 5058	6¼	14 " 0 "
Miami Prize 8100	6¼	14 " 0 "
Queen Mary of Woodlawn 11,659	3⅛	22 " 5 "
Sue Gallagher 15,945	3⅛	23 " 1½ "
Alfleda 6744	3⅛	16 " 4 "
Topaz of Woodlawn 11,661	3⅛	16 " 4 "
Pierrot's Picture 12,481	3⅛	16 " 0 "
Lady Alice of the Wilderness 12,207	3⅛	15 " 14 "
Lady Hayes 10,136	3⅛	15 " 12 "
Moonah's Pet 7484	3⅛	15 " 6 "
Gold Princess 8809	3⅛	14 " 12 "
Sister Cash 33,987	3⅛	14 " 10 "

Total, 37 *cows.*

1866.

BULLS.

ALBERT 44.

Color, orange fawn. Bred by W. B. Dinsmore, Staatsburg, N. Y. Dropped July 26th, 1866. Sire, Jerry 15. Dam, Frankie 17.

Albert 44 was remarkable for symmetry and elegance of form. His tested descendants outnumber those of any other bull.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Lady Mel 2d 1795	50	21 lbs. 0 oz.
Couch's Lily 3237	50	16 " 9 "
Lady Love 2d 2212	50	16 " 8 "
Kitty Colt 2213	50	15 lbs. 9½ oz.
Fragrance 4059	50	15 " 3 "
Lady Brown 4th 6911	50	14 " 12 "

Name.	Blood. Per Cent.	Butter Yield in Seven Days.	
Bloomfield Lady 6912	50	14 lbs.	12 oz.
Lady Gray of Hilltop 6850	37½	18 "	12 "
Cordelia Baker 8814	31¼	17 "	9 "
CARRIE LENA 3d 20,077	28⅛	**16** "	**5** "
Countess Potoka 7496	25	18 "	15 "
Belle Grinnell 4073	25	18 "	8 "
Rosa Miller 4333	25	17 "	7 "
Oktibbeha Duchess 4422	25	17 "	4 "
Jersey Cream 3151	25	17 "	4 "
Lucky Belle 2d 6037	25	16 "	14 "
Dusky 2535	25	16 "	10 "
Olie 4133	25	15 "	10 "
Brightness 3d 14,824	25	15 "	5 "
Louvie 3d 6159	25	14 "	13 "
Bright Lady 5938	25	14 "	12 "
Lady Gray of Hilltop 2d 14,641	25	14 "	12 "
Phyllis of Hill Crest 9067	25	14 "	12 "
Susette 4068	25	14 "	4 "
Maggie May 3255	25	14 "	2½ "
Lady Gray of Hilltop 3d 14,642	25	14 "	2 "
Rarity 2d 7724	25	14 "	2 "
Creamer 2467	25	14 "	1 "
Pretty 2526	25	14 "	1 "
Jersey Cream 3d 8521	18¾	16 "	5 "
Ethalka 2d 14,128	18¾	15 "	0 "
Prince's Bloom	18¾	14 "	3 "
Pet Clover 14,624	14 1/16	16 "	8 "
Geranium 2d 7838	12½	26 "	4¾ "
VALUE 2d 6844	12½	**25** "	2 11/12 "
Tenella 6712	12½	22 "	1½ "
Croton Maid 5305	12½	21 "	11½ "
Optima 6715	12½	21 "	8½ "
Œnone 8614	12½	18 "	15 "
Peggie Leah 3097	12½	18 "	12 "
May Blossom	12½	18 "	11 "
Summerline 8001	12½	18 "	6 "
Hepsy 2d 12,008	12½	17 "	8 "
Jennie of the Vale 9553	12½	17 "	7½ "
Floret 9959	12½	17 "	6 "
Valhalla 5300	12½	17 "	0 "
Arawana Queen 5368	12½	16 "	9 "
Belle of Paterson 5664	12½	16 "	6 "
Olie's Lady Teazle 12,307	12½	16 "	5 "
May Lankton 15,872	12½	16 "	1½ "

Name.	Blood. Per Cent.	Butter Yield in Seven Days.	
Edwina 6713	12½	15 lbs.	13 oz.
Valerie 6044	12½	15 "	13 "
Fanny Taylor 6714	12½	15 "	12 "
Princess Bellworth 6801	12½	15 "	10½ "
Etiquette 4300	12½	15 "	8 "
Signalana 7719	12½	15 "	4 "
Usilda 2d 6157	12½	15 "	2½ "
Aldarine 5301	12½	15 "	1½ "
Favorite Rajah Rex 16,153	12½	15 "	0 "
Mary Clover 9998	12½	14 "	15 "
Duchess of Argyle 3758	12½	14 "	13 "
Jersey Cream 2d 8519	12½	14 "	12 "
Bell Rex 11,700	12½	14 "	10 "
Princess Rose 6249	12½	14 "	8 "
Maggie C. 12,216	12½	14 "	6 "
Deborana 4718	12½	14 "	8 "
Maggie May 2d 12,926	12½	14 "	6 "
Jeannie Platt 6005	12½	14 "	5½ "
Lottie Rex 18,757	12½	14 "	4 "
Gem of Sassafras 8434	12½	14 "	3½ "
Pet Rex 20,166	12½	14 "	2½ "
Belle Grinnell 3d 16,503	12½	14 "	2 "
Kerni Rex 13,671	12½	14 "	0 "
Hurrah Pansy 12,153	12½	14 "	1½ "
Celeste Cox 12,948	10 13/16	20 "	8 "
Roll of Honor 13,610	9⅜	14 "	12 "
Chautauqua Queen 26,403	9⅜	14 "	11 "
Signetilia 16,333	9⅜	14 "	3 "
Fadette of Verna 3d 11,122	6¼	22 "	8½ "
Atlanta's Beauty 12,949	6¼	21 "	3 "
Celeste Cox 12,948	6¼	20 "	8 "
Fairy of Verna 2d 10,793	6¼	20 "	3¾ "
Hilda A. 2d 11,120	6¼	20 "	0 "
Gardiner's Ripple 11,693	6¼	19 "	12½ "
EVELINA OF VERNA 10,971	6¼	**19** "	**10½** "
Tenella 2d 19,521	6¼	18 "	12 "
Harmony 2d 17,118	6¼	18 "	3 "
Rosy Kate's Rex 13,192	6¼	18 "	8 "
Signaldella 24,107	6¼	18 "	1¾ "
TETTE 20,802	6¼	**17** "	**6** "
Colt's La Biche 6399	6¼	17 "	2½ "
Maggie Rex 28,623	6¼	17 "	0½ "
Polly Clover 7052	6¼	16 "	15 "
Grinnell Lass 11,859	6¼	16 "	10 "
Sister Rex 13,194	6¼	16 "	8 "
Gazella 3d 9355	6¼	16 "	3 "

COUCH'S LILY 3237.

Albert—Splendid Type.

GREEN MOUNTAIN HERD.

MOULTON BROTHERS, WEST RANDOLPH, VERMONT.

ALBERT REX 7724.

AT 4 YEARS OLD.

Albert—Eurotas Type.

GREEN MOUNTAIN HERD.

MOULTON BROTHERS, WEST RANDOLPH, VERMONT.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Dahlia ——	6¼	16 lbs.	0 oz.
Lady Cecilia 24,821	6¼	16 "	1 "
Rupertina 10,409	6¼	15 "	12½ "
Friz Cam 14,655	6¼	15 "	7 "
Orphean 4636	6¼	15 "	4 "
Elsie Lane 13,302	6¼	15 "	4 "
Earl Cow ——	6¼	15 "	0 "
Signal Maid 19,361	6¼	15 "	0 "
Clover Bloom 9788	6¼	14 "	14½ "
Cowles' Nonsuch 6199	6¼	14 "	12 "
Reception 3d 11,025	6¼	14 "	10 "
Sister Cash 33,987	6¼	14 "	10 "
Euphorbia 11,229	6¼	14 "	9½ "
Lilley Rex 9852	6¼	14 "	7 "
Susie La Biche 3d 15,171	6¼	14 lbs.	6½ oz.
Marpetra 10,284	6¼	14 "	6 "
Lady Clarendon 3d 17,578	6¼	14 "	5½ "
Monocacy Dimple 9680	6¼	14 "	3 "
Alberta Signal 18,611	3⅛	20 "	11 "
Guinevere Sinclair 11,167	$4\frac{11}{16}$	14 "	9 "
Belmeda 6229	3⅛	18 "	12 "
PERCIE 14,937	3⅛	18 " **14** "	10 " **6½** "
Lass Rex Alphea 16,965	3⅛	16 "	10¾ "
Rosona 12,956	3⅛	16 "	7 "
Alfleda 6744	3⅛	16 "	4 "
Sue Gallagher 15,945	$1\frac{9}{16}$	23 "	1½ "
Total, 122 *cows*.			

CLEMENT 115 (*F.* 61 *J. H. B.—H. C.*).

Color, light red and white ; hind legs white below hocks. Dropped 1866. Imported October, 1868, by J. H. McHenry, Maryland. Clement sired the bulls Orange Peel 502 (F. 129 J. H. B.—H. C.) and Orange Peel 864. Clement was half-brother of Lawrence 61.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Joan d'Arc 2163	50	16 lbs.	3½ oz.
Alice of Salem 5053	50	14 "	8 "
Nerissa of Nyack 9692	37½	15 "	1 "
Valma Hoffman 4500	25	21 "	0 "
Lucy Lanier 13,053	25	18 "	2 "
Conover's Beauty 12,650	25	18 "	0 "
Mary Norton 13,052	25	17 "	14 "
Portia of Nyack 9690	25	17 "	9 "
Ochra 2d 11,516	25	16 "	6½ "
Lustre 2062	25	15 "	8½ "
Buttery 3502	25	14 "	1 "
Witch Hazel 1360	25	14 "	0 "
Alberta Signal 18,611	18¾	20 "	11 "
Miami Prize 8100	25	14 "	0 "
Beauty of the Grange 7502	12½	23 "	9 "
Cora of Linwood 12,915	12½	22 "	0 "
Rosa of Bellevue 6954	12½	18 "	7½ "
Eveline of Jersey 6781	12½	18 "	6 "
Viva Le Brocq 13,702	12½	18 "	3 "
Mary Jane of Bellevue 6956	12½	17 "	7 "
Vixen 7591	12½	17 "	6 "
Beeswax 9807	12½	17 lbs.	5 oz.
Gold Trinket 9518	12½	17 "	2 "
Leonice 2d 8342	12½	16 "	8 "
Busy Bee 6336	12½	16 "	4 "
Lily of Maple Grove 5079	12½	16 "	3 "
Dot Buttercup 16,358	12½	16 "	2 "
Dairy Pride 4th 21,681	12½	16 "	0 "
Witch Hazel 4th 6131	12½	15 "	5½ "
Romping Lass 11,021	12½	15 "	0 "
Atricia 6029	12½	15 "	3 "
Royal Princess 22,013	12½	15 "	3 "
Dora Doon 12,909	12½	15 "	0 "
Rosy Dream 9808	12½	14 "	13 "
Gold Princess 8809	12½	14 "	12 "
Alice of the Meadows 20,748	12½	14 "	12 "
Opaline 7590	12½	14 "	10 "
Caroline 12,019	12½	14 "	8 "
Gilda 2779	12½	14 "	6 "
Denise 8281	12½	14 "	4½ "
Fandango 12,908	12½	14 "	3 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Litza 6338	12½	14	lbs.	3	oz.
Robinette 7114	12½	14	"	1	"
Romp Ogden 3d 5458	12½	14	"	1	"
Pixie 4115	12½	14	"	1	"
ETHLEEL 2d 32,291	9⅜	**30**	"	**15**	"
Bertha Black 26,275	9⅜	17	"	0	"
Rose of Oxford 13,469	9⅜	15	"	14½	"
Moberly Creamer 23,051	9⅜	14	"	5	"
Auntybel 12,582	9⅜	14	"	9	"
Mother Carey 11,746	6¼	27	"	1½	"
Island Star 11,876	6¼	21	"	3	"
Ethleel 18,724	6¼	19	"	14	"
Beauty Romeril 26,090	6¼	18	"	9	"
Bonnie Yost 7943	6¼	18	"	2	"
Floret 9959	6¼	17	"	6	"
Florinanna 24,354	6¼	17	"	5	"
Bellita 4553	6¼	17	"	2	"
Milkmaid Felch 12,339	6¼	16	"	7½	"
Troth 6139	6¼	16	"	5	"
Fear Not 2d 6061	6¼	16	"	2	"
Lily of Burr Oaks 1101	6¼	15	"	13	"
Countess Gasela 9571	6¼	15	"	11	"
Lady of Bellevue 7705	6¼	15	"	11	"
Etiquette 4300	6¼	15	"	8	"
Belle Dame 2d 22,048	6¼	15	"	3	"
Nelida 2d 22,043	6¼	15	"	2½	"
Naomi's Pride 16,745	6¼	15	"	2	"
Grace Felch 8291	6¼	15	"	0	"
Magnolia Ridgely 17,269	6¼	14	"	8	"
Fall Leaf 8587	6¼	14	"	8	"
Jaquenetta 10,958	6¼	14	"	6	"
Milkmaid of Burr Oaks 9035	6¼	14	"	5	"
Lucetta 6856	6¼	14	"	3	"
Variella of Linwood 10,954	6¼	14	"	1	"
Comtesse d'Espagna 10,308	6¼	14	"	0½	"
Sasco Bell 13,601	6¼	14	"	0	"
Élite 4299	6¼	14	"	0	"
Lizzie D. 10,408	6¼	14	"	0	"
Gazelle 15,961	6¼	14	"	0	"
Carlo's Fancy 14,591	6¼	14	"	0	"
Lotchen 19,823	4 11/16	16	"	7	"
Miss Porter 20,300	4 11/16	16	lbs.	6	oz.
Young Garenne 3d 13,648	4 11/16	16	"	3	"
Prize Rose 16,309	4 11/16	15	"	1	"
Niobe of Linwood 11,134	4 11/16	14	"	9	"
Cherokee Rose 20,921	3⅛	23	"	10	"
Jenny Dodo II. 14,448	3⅛	21	"	8	"
Hypathia 2d 14,774	3⅛	19	"	13½	"
Lady of the Isles 2d 16,652 (rated)	3⅛	19	"	11	"
The Widow's Daughter 11,507	3⅛	19	"	8½	"
Fan's Grouville Beauty 10,079	3⅛	19	"	3	"
LE BROCQ'S CURFEW 30,697	3⅛	18 ***15***	" "	0 ***12½***	" "
Attractive Maid 16,925	3⅛	16	"	13	"
Princess of Ashantee 13,467	3⅛	16	"	12	"
Corn 10,504	3⅛	16	"	2	"
Eclipse 14,427	3⅛	15	"	12	"
Les Marais Dell 20,314	3⅛	15	"	8	"
Queen of Ashantee 14,554	3⅛	15	"	2	"
Sunset of Pleasant View 13,071	3⅛	15	"	2	"
Cicero's Mabel 18,238	3⅛	15	"	2	"
Daisy Dixie 9469	3⅛	15	"	1	"
Romping Lass 11,021	3⅛	15	"	0	"
Jenny Williams 29,058	3⅛	15	"	0	"
Como Lass 24,369	3⅛	14	"	9	"
Medric Le Brocq 8888	3⅛	14	"	7	"
Bella Delaine 10,356	3⅛	14	"	5	"
Leoline 2d 18,315	3⅛	14	"	4	"
Nannie Fitch 9143	3⅛	14	"	4	"
Kate Pansy 15,177	3⅛	14	"	0½	"
Birdie Le Brocq 17,623	3⅛	14	"	0	"
Elinor Wells 12,060	3⅛	14	"	0	"
Le Rosa 10,078	3⅛	14	"	0	"
Nutley's Alma 13,581	3⅛	14	"	0	"
Frances C. Magnet 22,904	2 11/32	14	"	13½	"
Daisy Morrison 14,035	1 9/16	25	"	12½	"

Total, 116 *cows*.

SULTAN, F. 58 J. H. B.—H. C.

Color, light brown; white spot on left wither. Dropped 1866. First Prize over Jersey 1867–'68. Sire, Prince of Wales, son of Noble. Dam, Flower 53 J. H. B.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Fille de l'Air 2474	50	14 lbs.	0 oz.
Arletta 3d 14,274	46⅞	14 "	13½ "
Garenne 24,534	37½	16 "	3 "
Calendine 9415	31¼	20 "	5 "
Sultane 2d 11,373	31¼	16 "	8 "
Bramballetta 10,451	31¼	16 "	4 "
Mitten 13,368	31¼	15 "	11 "
Frugal 14,925	25	17 "	2¾ "
Thorndale Belle 3d 10,459	25	15 "	15 "
Regina 2d 2475	25	14 "	8 "
Belle Thorne 13,369	25	14 "	11 "
Mary of Gilderoy 11,219	25	14 "	4 "
Negress 7651	25	14 "	0 "
Rosebud of Allerton 6352	18¾	19 "	12 "
Queen of Delaware 17,029	18¾	18 "	13 "
Panatella 4778	18¾	18 "	3 "
Regina 4th 12,732	18¾	17 "	13½ "
Fear Not 6059	18¾	17 "	10 "
Faultless 12,018	18¾	17 "	5½ "
Faith of Oaklands 19,696	18¾	17 "	4 "
Lucilla Kent 8892	18¾	15 "	10 "
Enigma 5360	18¾	15 "	6 "
Fan of Grouville 7458	18¾	15 "	0 "
Alfritha 13,673	15⅝	15 "	3 "
Mary M. Allison 6308	12½	20 "	14 "
Chrome Skin 7881	12½	20 "	10 "
Belle of Prospect 2d 14,326	12½	19 "	0 "
Butter Star 7799	12½	18 "	4½ "
Cream of Sidney 17,028	12½	17 "	2½ "
Nightingale K. 2d 19,841	12½	16 "	14½ "
Ledonice 2d 8342	12½	16 "	8 "
Corinna 2d 6594	12½	16 "	5 "
Desire 9654	12½	16 "	3 "
Lady Alice of Hillcrest 7450	12½	16 "	3 "
Maid of Five Oaks 7178	12½	15 "	4 "
Merry Burlington 7600	12½	15 "	4 "
Gledelia 10,524	12½	15 "	0 "
Magnolia Ridgely 17,269	12½	14 "	8 "
Violet of Glencairn 10,221	12½	14 "	4 "
Queen of Prospect 11,997	12½	14 lbs.	2 oz.
Grace's Nightingale 19,855	12½	14 "	2 "
Walkyrie 5708	12½	14 "	1 "
Little Torment 15,581	9⅜	23 "	2½ "
Fear Not 2d 6059	9⅜	16 "	2 "
Fillpail 16,530	9⅜	15 "	11 "
Saragossa 22,019	9⅜	15 "	2 "
Cosetta 15,991	9⅜	14 "	11 "
Niobe of Linwood 11,134	9⅜	14 "	9 "
Sultan's Lily 18,099	9⅜	14 "	0 "
MAMELLE 20,804	7 1/32	**21** "	**8½** "
PRINCESS 2d 8046	6¼	46 "	12½ "
Niobe's Alpheanette 23,336	6¼	22 "	10½ "
Reception 8557	6¼	21 "	4½ "
Merry Duchess 13,693	6¼	18 "	9½ "
Lady Josephine 11,560	6¼	16 "	11½ "
Nutley Silverette 22,410	6¼	15 "	12½ "
Daisy 2d 15,761	6¼	15 "	8 "
Trudie 2d 4084	6¼	15 "	0 "
TETTE 20,802	6¼	**17** "	**6** "
St. Jeannaise 15,789	5 15/32	16 "	4 "
Eugenie Tourneur 24,532 (rated)	4 11/16	15 "	2½ "
ETHLEEL 2d 32,291	3⅛	**30** "	**15** "
Westphalia 24,384	3⅛	24 "	9½ "
Ona 7840	3⅛	22 "	10½ "
Daisy of St. Peters 18,175	3⅛	20 "	5½ "
Oakland's Cora 18,853	3⅛	19 "	9½ "
Valentine of Trinity 7460	3⅛	19 "	4 "
Fan's Grouville Beauty 10,079	3⅛	19 "	3 "
Beauty Romeril 26,090	3⅛	18 "	9 "
Queen of Nubbin Ridge 14,528	3⅛	17 "	8 "
Lactine 10,680	3⅛	17 "	1½ "
Pyrrha 6100	3⅛	16 "	14½ "
Daisy Queen 9619	3⅛	16 "	4 "
Dot Buttercup 16,358	3⅛	16 "	2 "
Dairy Pride 4th 21,681	3⅛	16 "	0 "
Brunette Le Gros 9755	3⅛	15 "	15 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Jenny Le Brocq 9757	3⅛	14 lbs. 14 oz.
COCOTTE 11,958	3⅛	14 " 12 "
		14 " 6 "
Como Lass 24,369	3⅛	14 lbs. 9 oz.
Brown Princess 30,941	3⅛	14 " 8 "
Total, 80 cows.		

BROWN PRINCE, F. 85 J. H. B.—H. C.

Color, fawn; white line across withers; white patch on right rump. Dropped November 1st, 1866. Sire, Prince of Wales. Dam, Browney, F. 113 J. H. B.—H. C.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Lady Velvetine 15,771	31¼	17 lbs. 2 oz.
Queen of Ashantee 14,554	28⅛	15 " 2 "
Nelly 6456	25	21 " 0 "
Lady of the Isles 2d 16,652 (rated)	25	19 " 11 "
Fear Not 6059	25	17 " 10 "
Coomassie 11,874	25	16 " 11 "
Queen of Ashantee 14,554	25	15 " 2 "
Daisy of St. Peters 18,175	12½	20 " 5½ "
Matin 7768	12½	17 " 11 "
Fear Not 2d 6061	12½	16 " 2 "
Little Torment 15,581	9⅜	23 " 2½ "
Daisy Brown 12,213	9⅜	17 " 6½ "
St. Jeannaise 15,789	9⅜	16 " 4 "
Ruby Wray ——	9⅜	16 " 0 "
Rose of Oxford 13,469	9⅜	15 " 14½ "
Romping Lass 11,021	9⅜	15 " 0 "
Ada Minka 15,562	9⅜	14 " 0 "
PRINCESS 2d 8046	6¼	46 " 12½ "
Ona 7840	6¼	22 lbs. 10½ oz.
Island Star 11,876	6¼	21 " 3 "
Olymph 17,957	6¼	17 " 8 "
Daisy Queen 9619	6¼	16 " 4 "
Les Cateaux 2d 15,538	6¼	16 " 1 "
Lady Kingscote 26,085	6¼	15 " 10 "
Lady Jane of St. Peters 7475	6¼	15 " 0 "
Lady Vertumnus 13,217	6¼	14 " 10 "
Auntybel 12,582	6¼	14 " 9 "
La Rouge 12,405	6¼	14 " 9 "
Como Lass 24,369	6¼	14 " 9 "
Blonde 2d 9268	6¼	14 " 4 "
Gazelle 15,961	6¼	14 " 0 "
Lady Young 16,668	6¼	14 " 0 "
ETHLEEL 2d 32,291	4 11/16	30 " 15 "
Young Garenne 3d 13,648	4 11/16	16 " 3 "
Prize Rose 16,309	4 11/16	15 " 1 "
Total, 35 cows.		

CLIFF 176.

Color, fawn, with smoky face and sides. Bred by D. B. Fearing, Massachusetts. Dropped March 29th, 1866.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Thisbe 2d 2201	50	19 lbs. 1½ oz.
Estrella 2831	50	14 " 12 "
St. Perpetua 2d 5557	25	14 " 0 "
Gossip 6165	12½	16 " 7 "
Corinna 2d 6594	12½	16 " 5 "
Lady Louise 4339	12½	15 " 0 "
Gilt 4th 4208	12½	14 " 0 "
Gilt Edge 2d 4420	12½	14 " 0 "
Gabrielle Champion 14,102	6¼	17 lbs. 8 oz.
GILT EDGE C. 12,223	6¼	15 " 9½ "
Cenie Wallace 2d 6557	6¼	15 " 4½ "
Bettie Dixon 4527	6¼	15 " 0 "
Florry Keep 6556	6¼	14 " 14 "
Leoline 2d 18,315	6¼	14 " 4 "
Sasco Bell 13,601	6¼	14 " 0 "
Total, 15 cows.		

CŒUR DE LION 318.

Color, brown fawn, gray and white. Dropped February, 1866. Imported from Island of Jersey, by Thomas Motley, Massachusetts, July 27th, 1868.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Maud Lee 2416	50	23 lbs.	0	oz.
Cornucopia 3414	50	15 "	12	"
Corinne 8518	50	14 "	7	"
Miss Bell 5083	25	14 "	15	"
Vivalia 12,760	25	14 lbs.	0	oz.
Mrs. Knickerbocker 19,367	12½	15 "	2	"
Ochra 2d 11,516	12½	16 "	6½	"
Total, 7 cows.				

COWS.

NELLY 55.

Color, gray and white. Dropped March, 1866. Bred by H. Kuhn. Sire, Charleston 1. Dam, Nannie 4.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.		
Mamie Coburn 3798	25	18 lbs.	4	oz.
Maggie May 3255	25	14 "	2½	"
Gilt Edge 2d 4420	25	14 "	0	"
Hazen's Nora 4791	12½	20 "	4	"
Marea 10,167	12½	17 "	10	"
Lucky Belle 2d 6037	12½	16 "	14	"
Emma Hudson 12,469	12½	16 "	8	"
Julia Evelyn	12½	15 "	15½	"
Valerie 6044	12½	15 "	13	"
GILT EDGE C. 12,223	12½	15 "	9½	"
Duchess Caroline 3d 6041	12½	15 "	8	"
Arawana Poppy 6053	12½	15 "	2	"
Bettie Dixon 4527	12½	15 "	0	"
Coronilla 8367	12½	14 "	9½	"
Pride of the Hill 4877	12½	14 "	8	"
Maggie May 2d 12,926	12½	14 lbs.	6	oz.
Maggie C. 12,216	12½	14 "	6	"
Minnie Lee 2d 6009	12½	14 "	3	"
Vivalia 12,760	12½	14 "	0	"
Starkville Beauty 4897	12½	14 "	0	"
Little Han 8004	12½	14 "	0	"
Atlanta's Beauty 12,949	6¼	21 "	3	"
Gabrielle Champion 14,102	6¼	17 "	8	"
Obella B. 10,575	6¼	17 "	4	"
Armon 10,862	6¼	16 "	13½	"
Mountain Lass 12,921	6¼	14 "	9	"
Marpetra 10,284	6¼	14 "	6	"
Therese M. 8364	6¼	14 "	2	"
La Rosa 10,078	6¼	14 "	0	"
Total, 29 cows.				

PANSY 1019.

Color, dark brown; line of back and back of legs light buff; black points. Bred by John H. Sutliff, Bristol, Conn. Dropped December 13th, 1866.

Pansy made five hundred and seventy-four and a half pounds of butter in one year.

PANSY 1019 AND TESTED DESCENDANTS.

Name	Blood, Per Cent.	Butter Yield in Seven Days.			
Pansy 1019 (rated)	100	20 lbs.	0	oz.
Gabrielle Champion 14,102	25	17 "	8	"
Silveretta 6852	25	16 "	9	"
Princess Sheila 7279	25	16 "	4½	"
Tobira 8400	25	15 "	13	"
GILT EDGE C. 12,223	25	15 "	9½	"
Marie C. Magnet 22,903	25	15 "	8	"
Champion's Chloe 12,225	25	15 "	5½	"
Dairy C. 12,227	25	15 "	0½	"
Coronilla 8367	25	14 "	9½	"
Maggie C. 12,216	25	14 "	6	"
Maggie May 2d 12,926	25	14 "	6	"
Lady Greville 12,930	25	14 "	6	"
Webster's Pet 4103	25	14 "	2	"
Therese M. 8364	25	14 "	2	"
Jessie Leavenworth 8248	25	14 "	2	"
Minnie Lee 2d 12,941	25	14 lbs.	3	oz.
Frances C. Magnet 22,904	12½	14 "	13½	"
Lady Gray of Hilltop 2d 14,641	12½	14 "	12	"
Bell Rex 11,700	12½	14 "	10	"
Lady Gray of Hilltop 3d 14,642	12½	14 "	2	"
Baby Buttercup 10,888	12½	14 "	0	"
Chautauqua Queen 26,403	9⅜	14 "	11	"
Kate Daisy 8204	9⅜	14 "	4	"
La Pera 2d 13,404	7$\frac{13}{16}$	14 "	8	"
Pet Clover 14,624	6¼	16 "	8	"
Ethalka 2d 14,128	6¼	15 "	0	"
Lilley Rex 9852	6¼	14 "	7	"
Celeste Cox 12,948	3⅛	20 "	8	"
Total, 29 *cows.*				

DAZZLE 379.

Color, fawn and white. Dropped in 1866. Imported from Jersey by C. Wellington, Massachusetts, March, 1868.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.		
LANDSEER'S FANCY 2876	25	21 lbs.	15	oz.
Jersey Queen of Barnet — 851 lbs. 1 oz. in one year.	25	19 "	4	"
Pride of Mashamoquet Farm 6469	25	16 "	1⅞	"
Snowdrop F. W. 16,848	25	14 "	8	"
Julia Walker 10,133	12½	15 "	12	"
Rosabel Hudson 5704	12½	15 "	12	"
Lady Hayes 10,136	12½	15 "	12	"
Rosy Dream 9808	12½	14 "	13	"
Gold Princess 8809	12½	14 lbs.	12	oz.
Queen Fannie 10,275	12½	14 "	2	"
Miami Prize 8100	12½	14 "	0	"
Starlight Rose 8804	12½	14 "	0	"
Pride of Eastwood ——	6¼	20 "	11	"
Emma Hudson 12,469	6¼	16 "	8	"
Pierrot's Picture 12,481	6¼	16 "	0	"
Pierrot's Lady Hayes 11,672	6¼	15 "	12	"
Sister Cash 33,987	6¼	14 "	10	"
Pierrot's Countess 12,480	6¼	14 "	0	"
Total, 18 *cows.*				

1867.

BULLS.

LAWRENCE 61.

Color, orange fawn and gray; black points; white spot on left shoulder. Dropped 1867. Imported from Jersey, 1868, by Thomas J. Hand, New York. Brother to Clement 115.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Memento 1913	50	14	lbs.	5	oz.
Turquoise 1129	50	14	"	3	"
Nan Day 17,192	28⅛	20	"	4	"
Lady of Bellevue 7705	25	15	"	11	"
Countess of Gasela 9571	25	15	"	11	"
Witch Hazel 4th 6131	25	15	"	5½	"
Bronze Leaf 14,902	25	15	"	1	"
Ma Belle 4942	25	15	"	0	"
Fall Leaf 8587	25	14	"	8	"
Lorella 12,913	25	14	"	7	"
Irene of Short Hills 5137	25	14	"	6½	"
Allie Minka 2982	25	14	"	6½	"
Cigarette 2849	25	14	lbs.	4	oz.
Muezzin 3670	25	14	"	0	"
The Widow's Daughter 11,507	12½	19	"	8½	"
Bonnie Yost 7943	12½	18	"	2	"
Grandiflora 9953	12½	15	"	8	"
Fannie Bugler 19,902	12½	15	"	2	"
Rosy Dream 9808	12½	14	"	13	"
Ada Minka 15,562	12½	14	"	0	"
Attractive Maid 16,925	6¼	22	"	5	"

Total, 21 *cows.*

BISMARCK 292.

Color, roan and white; black switch; horns crumpled. Dropped 1867. Imported by W. B. Dinsmore, New York, 1868.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Tilda 3720	50	16	lbs.	0	oz.
Almeda 3842	50	15	"	5	"
Zina 1434	50	14	"	7	"
Hazen's Bess 7329	25	24	"	11	"
Hazen's Nora 7329	25	20	"	4	"
Œnone 8614	25	18	"	15	"
Maggie Rex 28,623	25	17	"	0½	"
Polynia 10,753	25	16	"	7	"
Deborana 4718	25	14	"	8	"
Gabrielle Champion 14,102	12½	17	"	8	"
Herberta 8811	12½	16	"	15	"
Silveretta 6852	12½	16	"	9	"
Princess Sheila 7297	12½	16	"	4½	"
Alhena 15,955	12½	16	"	3	"
Tobira 8400	12½	15	lbs.	13	oz.
GILT EDGE C. 12,223	12½	15	"	9½	"
Marie C. Magnet 22,903	12½	15	"	8	"
Orphean 4636	12½	15	"	7	"
Champion's Chloe 12,225	12½	15	"	5½	"
Dairy C. 12,227	12½	15	"	0½	"
Coronilla 4636	12½	14	"	9½	"
Maggie C. 12,216	12½	14	"	6	"
Lady Greville 12,930	12½	14	"	6	"
Maggie May 2d 12,926	12½	14	"	6	"
Minnie Lee 2d 12,941	12½	14	"	3	"
Webster's Pet 4103	12½	14	"	2	"
Therese M. 8364	12½	14	"	2	"
Jessie Leavenworth 8248	12½	14	"	2	"

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Beauty Bismarck 4967	12½	14 lbs.	1 oz.
VALUE 2d 6844	6¼	25 "	2 11/12 "
Belmeda 6229	6¼	18 "	12 "
Katie Bashford 15,982	6¼	17 "	0 "
May Lankton 15,872	6¼	16 "	1½ "
Lady Gray of Hilltop 2d 14,641	6¼	14 "	12 "
Bell Rex 11,700	6¼	14 "	10 "
Kate Daisy 8204	6¼	14 lbs.	4 oz.
Lady Gray of Hilltop 3d 14,642	6¼	14 "	2 "
Hurrah Pansy 12,153	6¼	14 "	1½ "
Baby Buttercup 10,888	6¼	14 "	0 "
La Pera 2d 13,404	3⅛	14 "	8 "
Lilley Rex 9852	3⅛	14 "	7 "
Total, 41 *cows.*			

VICTOR 3550.

Color, squirrel gray and white. Dropped September, 1867. Bred by L. H. Bowker, Massachusetts.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Jersey Belle of Scituate 7828	75	25 lbs.	3 oz.
705 lbs. in one year.			
Minnie of Scituate 17,829	68¾	14 "	4½ "
Belle of Scituate 7977	37½	18 "	0 "
Pauline's Vivienne 11,305	37½	16 "	13 "
Lass of Scituate 9555	37½	15 lbs.	14½ oz.
Scituate of Woronoco 18,040	9⅜	24 "	14 "
Lily Scituate 12,665	9⅜	24 "	9½ "
Total, 7 *cows.*			

ROB ROY 17.

Color, gray; black points. Dropped November, 1867. Imported from Jersey by S. C. Colt, Hartford, Conn., July 10th, 1869.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Belle Hartford 2718	50	15 lbs.	0 oz.
Eugenie 2d 1623	50	14 "	0 "
Princess Rose 6249	37½	14 "	8 "
Belle Grinnell 4073	25	18 "	8 "
White Clover Leaf 4512	25	17 "	15 "
Fair Starlight 1745	25	17 "	7½ "
Corolla 4392	25	17 "	4 "
Jersey Cream 2d 8519	25	14 "	12 "
Chloe Beach 3931	25	14 "	6½ "
Lucy Gaines' Buttercup 5058	25	14 "	0 "
St. Perpetua 2d 5557	25	14 "	0 "
Countess Potoka 7496	12½	18 "	15 "
Hepsy 2d 12,008	12½	17 "	8 "
Katie Bashford 15,982	12½	17 lbs.	0 oz.
Jersey Cream 3d 8521	12½	16 "	5 "
Arawana Queen 5368	12½	16 "	9 "
Lily of Maple Grove 5079	12½	16 "	3 "
Princess Bellworth 6801	12½	15 "	10½ "
Arawana Buttercup 6052	12½	15 "	5 "
Usilda 2d 6157	12½	15 "	2½ "
Favorite Rajah Rex 16,153	12½	15 "	0 "
Louvie 3d 6159	12½	14 "	13 "
Bell Rex 11,700	12½	14 "	10 "
Jenny of the Vale 9553	12½	14 "	6½ "
Jeannie Platt 6005	12½	14 "	4 "
Lottie Rex 18,757	12½	14 "	4 "
Pet Rex 20,166	12½	14 "	2½ "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Belle Grinnell 3d 16,503	12½	14 lbs.	2 oz.
Kerni Rex 13,671	12½	14 "	0 "
Hillside Gem 16,640	6¼	20 "	0 "
Gardiner's Ripple 11,693	6¼	19 "	12½ "
Rosy Kate's Rex 13,192	6¼	18 "	8 "
Maggie Rex 28,263	6¼	17 "	0½ "
Grinnell Lass 11,859	6¼	16 "	10 "
Sister Rex 13,194	6¼	16 "	8 "
Lida Mullin 9198	6¼	16 "	8 "
CARRIE LENA 3d 20,077	6¼	**16** "	**5** "
Olie's Lady Teazle 12,307	6¼	16 lbs.	5 oz.
Lady Cecilia 24,821	6¼	16 "	1 "
Elsie Lane 13,302	6¼	15 "	4 "
Chautauqua Queen 26,403	6¼	14 "	11 "
Sister Cash 33,987	6¼	14 "	10 "
Euphorbia 11,229	6¼	14 "	9½ "
Lilley Rex 9852	6¼	14 "	7 "
Prince's Bloom 9729	6¼	14 "	3 "
Lizzie D. 10,408	6¼	14 "	0 "
Ethalka 2d 14,128	3⅛	15 "	0 "
Total 47 *cows.*			

COWS.

LADY MARY 1148.

Color, pure gray; black tongue; black switch. Dropped 1867. Imported from Jersey, September 21st, 1868, by William H. Schieffelin, New York.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Welma 5942	37½	17 lbs.	8 oz.
Chenda 4599	37½	15 "	9½ "
Calypris 5943	37½	15 "	4½ "
Evri 5282	37½	15 "	4 "
Pussie 3035	25	19 "	1 "
Lady of Bellevue 7705	25	15 "	11 "
Countess Gasela 9571	25	15 "	11 "
Witch Hazel 4th 6131	25	15 "	5½ "
Fall Leaf 8587	25	14 "	8 "
Lorella 12,913	25	14 "	7 "
Geranium 7838	18¾	26 "	4¾ "
Tenella 6712	18¾	22 "	1½ "
Cora of Linwood 12,915	18¾	22 "	0 "
Croton Maid 5305	18¾	21 "	11½ "
Optima 6715	18¾	21 "	3½ "
Œnone 8614	18¾	18 "	15 "
Fair Starlight 1745	18¾	17 "	7½ "
Vixen 7591	18¾	17 "	6 "
Beeswax 9807	18¾	17 "	5 "
Bellita 4553	18¾	17 "	2 "
Valhalla 5300	18¾	17 "	0 "
Belle of Patterson 5664	18¾	16 "	6 "
Troth 6139	18¾	16 "	5 "
Busy Bee 6336	18¾	16 "	4 "
EUPHONIA 6783	18¾	**16** "	0½ "
Fleurette of Linwood 12,918	18¾	16 lbs.	0 oz.
Edwina 6713	18¾	15 "	13 "
Fanny Taylor 6714	18¾	15 "	12 "
Lisetta Johnson 5321	18¾	15 "	10 "
Denise 8281	18¾	15 "	9 "
Etiquette 4300	18¾	15 "	8 "
Jewell 3d ——	18¾	15 "	4 "
Signalana 7719	18¾	15 "	4 "
Aldarine 5301	18¾	15 "	1½ "
Jenny Williams 29,058	18¾	15 "	0 "
Dora Doon 12,909	18¾	15 "	0 "
Opaline 7590	18¾	14 "	10 "
Medrie Le Brocq 8888	18¾	14 "	7 "
Marpetra 10,284	18¾	14 "	6 "
Litza 6338	18¾	14 "	3 "
Fandango 12,908	18¾	14 "	3 "
Romp Ogden 3d 5458	18¾	14 "	1 "
Comtesse d'Espagna 10,308	18¾	14 "	0½ "
Le Rosa 10,078	18¾	14 "	0 "
Elite 4299	18¾	14 "	0 "
ETHLEEL 2d 32,291	14 1/16	**30** "	**15** "
Signetilia 16,333	14 1/16	14 "	3 "
The Widow's Daughter 11,507	12½	19 "	8½ "
Fanny Bugler 19,962	12½	15 "	2 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Rosy Dream 9808	12½	14 lbs. 13 oz.
Cherokee Rose 20,921	9⅜	23 " 10 "
Fadette of Verna 3d 11,122	9⅜	22 " 8½ "
Attractive Maid 16,925	9⅜	22 " 5 "
Atlanta's Beauty 12,949	9⅜	21 " 3 "
Celeste Cox 12,948	9⅜	20 " 8 "
Fairy of Verna 2d 10,973	9⅜	20 " 3¾ "
Hilda A. 2d 11,120	9⅜	20 " 0 "
Ethleel 18,724	9⅜	19 " 14 "
Gardiner's Ripple 11,693	9⅜	19 " 12½ "
EVELINA OF VERNA 10,971	9⅜	**19 " 10½ "**
Tenella 2d 19,521	9⅜	18 " 12 "
PERCIE 14,937	9⅜	18 " 10 " **14 " 6½ "**
Harmony 2d 17,118	9⅜	18 " 3 "
Signaldella 24,107	9⅜	18 " 1¾ "
Rupertina 10,409	9⅜	15 " 1½ "
Bertha Black 26,275	9⅜	17 " 0 "
Troth Plight 10,258	9⅜	16 " 4 "
Gazella 3d 9355	9⅜	16 " 3 "
Dahlia ——	9⅜	16 " 0 "
Thorndale Belle 3d 10,459	9⅜	15 " 15 "
Mitten 13,368	9⅜	15 " 11 "
Pinafore 2d 15,072	9⅜	15 " 8 "
Friz Cam 14,655	9⅜	15 lbs. 7 oz.
Alfritha 13,673	9⅜	15 " 3 "
Romping Lass 11,021	9⅜	15 " 0 "
Earl Cow ——	9⅜	15 " 0 "
Signal Maid 19,361	9⅜	15 " 0 "
Belle Thorne 13,369	9⅜	14 " 11 "
Reception 3d 10,025	9⅜	14 " 10 "
Euphorbia 11,229	9⅜	14 " 9¾ "
Guinevere Sinclair 11,167	9⅜	14 " 9 "
Jaquenetta 10,958	9⅜	14 " 6 "
Lady Clarendon 3d 17,578	9⅜	14 " 5½ "
Variella of Linwood 10,954	9⅜	14 " 1 "
Jennie Johnson 3d 6782	9⅜	14 " 0 "
Sadie's Choice 7979	9⅜	14 " 0 "
Fair Starlight 7745	6½	17 " 7½ "
Daisy Morrison 14,035	4 11/16	25 " 12½ "
Alberta Signal 18,611	4 11/16	20 " 11 "
Pansy Patterson 18,612	4 11/16	15 " 15 "
Frances C. Magnet 22,904	4 11/16	14 " 13½ "
Lottie Rex 18,757	4 11/16	14 " 4 "
Daisy Hamilton 18,301	4 11/16	14 " 0 "
Duchess of Manchester 20,838	4 11/16	14 " 0 "

Total, 94 *cows.*

1868.

BULLS.

ST. HELIER 45.

Color, bright salmon fawn and silver gray. Bred to order of O. S. Hubbell, by Philip Quenault, St. Martin, Jersey. Dropped June 30th, 1868. Imported by O. S. Hubbell, Stratford, Conn., June 15th, 1869. Mr. Hubbell kept him at the head of his herd six years, when he presented him to General Lincoln, of Worcester, Mass., in 1875, where he was kept until his death, in 1879. The dam of St. Helier made at the rate of twenty-three pounds of butter in seven days on the Island of Jersey. This famous bull was the product of forty years of inbreeding in one line.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Lesbie 9179	87½	16 lbs. 3 oz.
Volie 19,465	81¼	18 " 1 "
Renini 9181	81¼	14 " 10½ "
Taglioni 9182	81¼	14 " 1 "
Queen of Chenango 17,771 (at 2 years)	78¼	14 lbs. 6 oz.
Trenie 17,770 (at 2 years)	78¼	14 " 6 "
Chroma 4572	75	20 " 6 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Pyrola 4566	75	18 lbs.	6 oz.
Safrano 4568	75	14 "	2½ "
Zithey 9184	68¾	16 "	7 "
Nipheta 9180	68¾	16 "	0 "
Maculac 17,118	68¾	15 "	3 "
Bintana 9837	68¾	14 "	3½ "
Flamant 11,270	59⅜	14 "	2 "
Meines 3d 7741	50	20 "	1 "
Ianthe 4562	50	19 "	11 "
Chenie 4570	50	19 "	7½ "
Kaoli 18,980	50	17 "	8 "
Oxalis 2d 15,631	50	15 "	0 "
Pavon 12,485	50	14 "	8 "
Del of Willow Farm 22,461	50	14 "	8 "
Silene 4307	50	14 "	0 "
Jule 3640	50	14 "	0 "
Silenta 17,685	43¾	15 "	10 "
Bessie Bradford 2d 7271	37½	15 lbs.	2 oz.
Nannie Fitch 9143	37½	14 "	4 "
Reckless 3569	25	17 "	8 "
Mhoon Lady 6560	25	17 "	3 "
Avis E. 9714	25	15 "	14 "
Cenie Wallace 2d 6557	25	15 "	4½ "
Florry Keep 6556	25	14 "	14 "
Mountain Lass 12,921	25	14 "	9 "
Daisy Hamilton 18,301	18¾	14 "	0 "
Willis 2d 4461	12½	16 "	3 "
Renown 13,729	12½	14 "	6 "
Lebanon Daughter 6106	12½	14 "	4 "
Lebanon Lass 6108	12½	14 "	2 "
Reality 16,537	6¼	15 "	3½ "
Marpetra 10,286	6¼	14 "	6 "

Total, 39 *cows*.

LANDSEER 331.

Imported in dam Dazzle 379, March 31st, 1868, by C. Wellington, Massachusetts. Dropped September 18th, 1868.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
LANDSEER'S FANCY 2876	50	**21** lbs.	**15** oz.
Pride of Mashamoquet Farm 6469	50	16 "	1¾ "
Rosabel Hudson 5704	25	15 "	12 "
Julia Walker 10,133	25	15 "	12 "
Rosy Dream 9808	25	14 "	13 "
Little Sister 11,666	25	14 "	12 "
Gold Princess 8809	25	14 "	12 "
Queen Fanny 10,275	25	14 "	2 "
Miami Prize 8100	25	14 "	0 "
Starlight Rose 8804	25	14 lbs.	0 oz.
Lady Hayes 10,136	18¾	15 "	12 "
Pride of Eastwood ——	12½	20 "	11 "
Emma Hudson 12,469	12½	16 "	8 "
Pierrot's Picture 12,481	12½	16 "	0 "
Pierrot's Lady Hayes 11,672	12½	15 "	12 "
Sister Cash 33,987	12½	14 "	10 "
Pierrot's Countess 12,480	12½	14 "	0 "
Hypathia 2d 14,774	3⅛	19 "	13 "

Total, 18 *cows*.

RAJAH 340.

Color, black and tan, with squirrel gray back. Dropped January 1st, 1868. Bred by Clement Buesnel, Grouville, Jersey. Imported by John S. Barstow, Rhode Island, June 17th, 1869.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Oonan 1485	50	22 lbs.	2½ oz.
Fantine 1271	50	15 "	6 "
Spirea 3915	50	14 lbs.	0 oz.
Moonah's Pet 7484	37½	15 "	6 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Pride of the Hill 4877	37½	14 lbs.	8	oz.
Hazen's Nora 4791	25	20 "	4	"
Roonan 5133	25	20 "	4	"
Mamie Coburn 3798	25	17 "	8	"
Dudu of Linwood 8336	25	16 "	7½	"
Callie Nan 7959	25	16 "	2	"
Roselaine 7167	25	15 "	7	"
Arawana Buttercup 6052	25	15 "	2	"
Pet Lee 7993	25	14 "	12	"
Enid 2d 10,783	25	14 "	7½	"
Rose of Hillside 3866	25	14 "	3½	"
Maggie May 3255	25	14 "	2½	"
Myrtle of Ridgewood 7858	25	14 "	1	"
Gilt Edge 2d 4420	25	14 "	0	"
Little Han 8004	25	14 "	0	"
Bennie Hinman 7166	25	14 "	0	"
Calendine 9415	12½	20 "	5	"
Marea 10,167	12½	17 "	10	"
Lucky Belle 2d 6037	12½	16 "	14	"
Arawana Queen 5368	12½	16 "	9	"
Emma Hudson 12,469	12½	16 "	8	"
Bramballetta 10,451	12½	16 "	4	"
Valerie 6044	12½	15 "	13	"
GILT EDGE C. 12,223	12½	15 "	9½	"
Duchess Caroline 3d 6041	12½	15 "	8	"
Julia Evelyn 6007	12½	15 "	5½	"
Calypris 5943	12½	15 "	4½	"
Bellini's Maid 15,170	12½	15 lbs.	1½	oz.
Bettie Dixon 4527	12½	15 "	0	"
Bellini La Biche 15,091	12½	14 "	14½	"
Florry Keep 6556	12½	14 "	14	"
Cosetta 15,991	12½	14 "	11	"
Coronilla 8367	12½	14 "	9½	"
Mountain Lass 12,921	12½	14 "	9	"
Susie La Biche 3d 15,171	12½	14 "	6½	"
Maggie C. 12,216	12½	14 "	6	"
Maggie May 2d 12,926	12½	14 "	6	"
Minnie Lee 2d 12,941	12½	14 "	3	"
Walkyrie 5708	12½	14 "	1	"
Starkville Beauty 4897	12½	14 "	0	"
Vivalia 12,760	12½	14 "	0	"
Scituate of Woronoco 18,040	6¼	24 "	14	"
Atlanta's Beauty 12,949	6¼	21 "	3	"
Gabrielle Champion 14,102	6¼	17 "	8	"
Obella B. 10,575	6¼	17 "	4	"
Armon 10,862	6¼	16 "	13½	"
Dora Doon 12,909	6¼	15 "	0	"
Favorite Rajah Rex 16,153	6¼	15 "	0	"
Marpetra 10,284	6¼	14 "	6	"
Therese M. 8364	6¼	14 "	2	"
Le Rosa 10,078	6¼	14 "	0	"
Daisy Hamilton 18,301	6¼	14 "	0	"

Total, 56 *cows*.

MR. MICAWBER 556.

Color, steel gray. Dropped 1868. Imported by Thomas Motley, 1869.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.		
Countess Micawber 1759	50	17 lbs.	1	oz.
Clara of Lakeside 10,827	37½	15 "	0	"
Mink 2d 3890	25	19 "	11	"
Medrena 3939	25	18 "	4	"
Lady Essex 4749	25	18 "	0¾	"
Mirtha 3437	25	17 "	13¼	"
Mink 3d 4868	25	14 "	9	"
Dolly of Lakeside 10,284	25	14 "	8	"
Woodland Lass 3444	25	14 "	0	"
Marie C. Magnet 22,903	12½	15 lbs.	8	oz.
Dove Dee 18,059	12½	15 "	3	"
Village Maid 7069	12½	14 "	0	"
Frances C. Magnet 22,904	9⅜	14 "	13½	"
Mhoon Lady 6560	6¼	17 "	3	"
Julia Evelyn 6007	6¼	15 "	15½	"
Medrie Le Brocq 8888	6¼	14 "	7	"
Therese M. 8364	6¼	14 "	2	"

Total, 17 *cows*.

DOLPHIN 2d 468.

Color, dark fawn; back and loins tipped with silver gray. Dropped March, 1868. Bred by F. M. Wilson, England. Imported from England, November, 1869, by Colonel R. M. Hoe, New York.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Miss Willie Jones 6918	25	16 lbs.	4 oz.
Pride of Corisande 5323	25	16 "	0 "
Gray Therese 5322	25	16 "	0 "
Zalma 8778	25	15 "	5 "
Forget-Me-Not-O 10,564	25	15 "	4 "
Faustine 10,354	25	14 "	14½ "
Silversides 3857	25	14 "	3 "
Pet Rex 20,166	25	14 "	2½ "
Robinette 7114	25	14 "	1 "
Silver Bell 4313	25	14 "	0 "
True Inwardness 10,262	25	14 "	0 "
Niobe's Alpheanette 23,336	12½	22 "	10½ "
Colie 8309	12½	18 "	4 "
Typha 5870	12½	16 lbs.	11 oz.
Idaletta 11,843	12½	15 "	14½ "
Dia 13,658	12½	15 "	13 "
Fillpail 16,530	12½	15 "	11 "
Idalene 11,841	12½	15 "	8½ "
Calpurnia 13,267	12½	15 "	3½ "
Marvel 13,734	12½	15 "	1 "
Signetilia 16,333	12½	14 "	3 "
Sadie's Choice 7979	12½	14 "	0 "
Alberta Signal 18,611	6¼	20 "	11 "
Smoky 13,933	6¼	14 "	9 "

Total, 24 *cows*.

VICTOR HUGO 197.

Color, black and dark brown. Bred by J. DeVeulle, St. Clement, Jersey. Imported August, 1868, by S. S. Stephens, Montreal, Canada.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Oaklands Nora 14,880	50	23 lbs.	5 oz.
Lady Fawn of St. Anne's 10,920	50	16 "	12½ "
Tidy of St. Lambert 31,114	50	14 "	2 "
Melia Ann 5444	37½	18 "	0½ "
Carrie Pogis 22,568	37½	15 "	9 "
Moss Rose of St. Lambert 5114	37½	15 "	8½ "
Coquette of Glen Rouge 17,559	37½	15 "	1½ "
IDA OF ST. LAMBERT 24,990	25	**30** "	**2¼** "
Sweet Brier of St. Lambert 5481	25	22 lbs.	12 oz.
Brenda of Elmhurst 10,762	25	20 "	8 "
Rioter's Maggie 22,530	25	18 "	6½ "
Cowslip of St. Lambert 8349	25	17 "	12 "
Minette of St. Lambert 9774	25	17 "	4 "
Jolie of St. Lambert 5126	25	15 "	13½ "
Lucy Dale 5129	25	15 "	12 "
Duchess of St. Lambert 5111	25	15 "	11 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
May Day Stoke Pogis 28,383	25	15 lbs. 8 oz.
Uinta 5743	25	14 " 10 "
Gem of St. Cloud 7342	25	14 " 8½ "
Nancy of St. Lambert 12,964	25	14 " 5 "
Clematis of St. Lambert 5478	25	14 " 3 "
Bonnie Fawn 6190	25	14 " 0 "
Rose of St. Lambert 20,426	$20\frac{5}{16}$	21 " 3½ "
MARY ANNE OF ST. LAMBERT 9770	18¾	36 " 12½ "
Daisy Morrison 14,035	18¾	25 " 12½ "
NAIAD OF ST. LAMBERT 12,695	18¾	22 " 2½ "
Crocus of St. Lambert 8351	18¾	17 " 12 "
Maggie Sheldon 23,583	18¾	15 " 3 "
Honeysuckle of St. Anne's 18,674	18¾	14 " 14 "
Rioter's Beauty 14,894	18¾	14 " 0 "
MERMAID OF ST. LAMBERT 9771	12½	25 " 13½ "
Nora of St. Lambert 12,962	12½	22 lbs. 0 oz.
NIOBE OF ST. LAMBERT 12,969	12½	21 " 4½ "
Honeymoon of St. Lambert 11,221	12½	20 " 5½ "
RIOTER PINK OF BERLIN 23,665	12½	19 " 14 "
Judith Coleman 11,391	12½	17 " 5 "
Baronetti 8425	12½	16 " 14 "
Chamomilla 7552	12½	16 " 10 "
Diana of St. Lambert 6636	12½	16 " 8 "
Cill of Glen Rouge 13,818	12½	16 " 6 "
Moth of St. Lambert 9775	12½	16 " 2 "
Bonnie 2d 5742	12½	14 " 11½ "
Pearl of St. Lambert 5527	12½	14 " 2 "
Nordheim Creamer 9758	12½	14 " 0 "
Flower of Glen Rouge 17,560	9⅜	23 " 14¾ "
Aleph Judea 11,389	9⅜	15 " 1¾ "
Rioter's Nora 21,778	9⅜	15 " 9 "
Obella B. 10,575	6¼	17 " 4 "

Total, 48 cows.

COWS.

PRIDE OF WINDSOR 483.

Color, brown. Bred at Shaw Farm, Windsor Park, England. Imported August 17th, 1868, by S. S. Stephens, of Montreal, Canada.

Mr. Valancey E. Fuller writes of Pride of Windsor: "She was a cow of immense substance, and milked sixteen quarts a day at fourteen years, on grass alone."

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Duchess of St. Lambert 5111	50	15 lbs. 13 oz.
Lily of St. Lambert 5120	50	14 " 0 "
Coquette of Glen Rouge 17,559	43¾	15 " 1½ "
Cill of Glen Rouge 13,818	37½	16 " 6 "
Rioter's Nora 21,178	37½	15 " 9 "
Honeysuckle of St. Anne's 18,672	31¼	14 " 14 "
Sweet Brier of St. Lambert 14,880	25	22 lbs. 12 oz.
Nora of St. Lambert 12,962	25	22 " 9 "
Flower of Glen Rouge 17,560	15⅝	23 " 14¾ "
MERMAID OF ST. LAMBERT 24,990	12½	25 " 13½ "
RIOTER PINK OF BERLIN 23,665	12½	19 " 14 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Moth of St. Lambert 9775	12½	16 lbs.	2 oz.
Moss Rose of St. Lambert 5114	12½	15 "	8½ "
Pearl of St. Lambert 5527	12½	14 "	2 "
Rioter's Beauty 14,894	9⅜	14 "	0 "
MARY ANNE OF ST. LAMBERT 9770	6¼	**36** "	**12½** "
NAIAD OF ST. LAMBERT 12,965	6¼	**22** lbs.	**2½** oz.
Rose of St. Lambert 20,426	6¼	21 "	3½ "
Crocus of St. Lambert 8351	6¼	17 "	12 "
Judith Coleman 11,391	6¼	17 "	5 "
Aleph Judea 11,389	6¼	15 "	1¾ "
Total, 21 cows.			

PAULINE 494.

Bred by Eli Hubert, St. Ouens, Jersey. Imported in dam Hebe, August 17th, 1868. Dropped October 18th, 1868.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Melia Ann 5444	37½	18 lbs.	0½ oz.
Oaklands Nora 14,880	25	23 "	5 "
Sweetbrier of St. Lambert 5481	25	22 "	12 "
NIOBE OF ST. LAMBERT 12,969	25	**21** "	**9½** "
Rioter's Maggie 22,530	25	18 "	6½ "
Jolie of St. Lambert 5126	25	15 "	13 "
Duchess of St. Lambert 5111	25	15 "	12 "
Uinta 5743	25	14 "	10 "
Clematis of St. Lambert 5478	25	14 "	3 "
Bonnie Fawn 6190	25	14 "	0 "
Rose of St. Lambert 20,426	23$\frac{7}{16}$	21 "	3½ "
Carrie Pogis 22,568	18¾	15 "	9 "
IDA OF ST. LAMBERT 24,990	12½	**30** "	**2½** "
Daisy Morrison 14,035	18¾	25 "	12½ "
Nora of St. Lambert 12,962	12½	22 "	0 "
Brenda of Elmhurst 10,762	12½	20 "	8 "
Honeymoon of St. Lambert 11,221	12½	20 "	5½ "
Cowslip of St. Lambert 8349	12½	17 "	12 "
Minnette of St. Lambert 9774	12½	17 "	4 "
Baronetti 8425	12½	16 "	14 "
Chamomilla 7552	12½	16 "	10 "
Diana of St. Lambert 6636	12½	16 lbs.	8 oz.
Moss Rose of St. Lambert 5114	12½	15 "	8½ "
Maggie Sheldon 23,583	12½	15 "	3 "
May Day Stoke Pogis 28,383	12½	15 "	3 "
Coquette of Glen Rouge 17,559	12½	15 "	1¼ "
Honeysuckle of St. Anne's 18,672	12½	14 "	14 "
Bonnie 2d 5742	12½	14 "	11½ "
Obella B. 10,575	9⅜	17 "	4 "
Rioter's Nora 21,178	9⅜	15 "	9 "
Rioter's Beauty 14,894	9⅜	14 "	0 "
MARY ANNE OF ST. LAMBERT 9770	6¼	**36** "	**12½** "
MERMAID OF ST. LAMBERT 9771	6¼	**25** "	**13½** "
Flower of Glen Rouge 17,560	6¼	23 "	14¾ "
NAIAD OF ST. LAMBERT 12,965	6¼	**22** "	**2½** "
RIOTER PINK OF BERLIN 23,665	6¼	**19** "	**14** "
Crocus of St. Lambert 8351	6¼	17 "	12 "
Judith Coleman 11,391	6¼	17 "	5 "
Aleph Judea 11,389	6¼	15 "	1¾ "
Total, 39 cows.			

EMBLEM 90.

Color, gray; belly and legs partly white; dark dish face; black tongue. Dropped February, 1868. Bred by E. Gibaut, Jersey. Imported by T. J. Hand, New York, October, 1868.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Cora of Linwood 12,915	25	22 lbs.	0 oz.
Vixen 7591	25	17 "	6 "
Busy Bee 6336	25	16 "	4 "
Fleurette of Linwood 12,918	25	16 "	0 "
Denise 8281	25	15 "	9 "
Romping Lass 11,021	25	15 "	0 "
Opaline 7590	25	14 "	10 "
Litza 6338	25	14 "	3 "
Fandango 12,908	25	14 "	3 "
Romp Ogden 3d 5458	25	14 "	1 "
ETHLEEL 2d 32,291	18¾	**30** "	**15** "
Cherokee Rose 20,921	12½	23 "	10 "
Ethleel 18,724	12½	19 "	14 "
Troth 6139	12½	16 "	5 "
Corn 10,504	12½	16 "	2 "
Etiquette 4300	12½	15 "	8 "
Jaquenetta 10,958	12½	14 "	6 "
Variella of Linwood 10,954	12½	14 lbs.	1 oz.
Comtesse d'Espagna 10,308	12½	14 "	0½ "
Sasco Bell 13,601	12½	14 "	0 "
Bertha Black 26,275	6¼	17 "	4 "
Attractive Maid 16,925	6¼	16 "	13 "
Troth Plight 10,258	6¼	16 "	4 "
EUPHONIA 6783	6¼	**16** "	**0½** "
Rosy Dream 9808	6¼	14 "	13 "
Nannie Fitch 9143	6¼	14 "	4 "
Daisy Morrison 14,035	3⅛	25 "	12½ "
PERCIE 14,937	3⅛	18 "	10 "
		14 "	**6½** "
Lottie Rex 18,757	3⅛	14 "	4 "
Daisy Hamilton 18,301	3⅛	14 "	0 "
Duchess of Manchester 20,838	3⅛	14 "	0 "
Total, 31 cows.			

DANDELION 2521.

Color, pure lemon fawn; dark face, white star. Dropped March 10th, 1868. Imported by W. H. T. Hughes, for James B. Williams, Glastonbury, Conn., April 6th, 1870.

DANDELION AND TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Dandelion 2521 (at 15 yrs.)	100	16 lbs.	9 oz.
Gentle of Glastonbury 4651	50	14 "	0 "
Pretty 2526	50	14 "	0 "
Roll of Honor 13,610	25	14 lbs.	12 oz.
Sunset 15,130	15⅝	16 "	2½ "
Total, 5 cows.			

For portraits of Dandelion 2521, her son Dandy Boy 7334, and two daughters, see frontispiece.

EDDINGTON 2250.

AT 8 YEARS OLD.

Rioter Type.

SIMPSON HERD.

WILLIAM SIMPSON, 51 CHATHAM STREET, NEW YORK.

1869.

BULLS.

RIOTER 2d 469.

Color, solid dark fawn and gray. Bred by the Marquis of Bristol, England. Dropped April, 1869. Imported by Colonel R. M. Hoe, New York, November, 1869.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Eurotas 2454	50	22 lbs. 7 oz.
and 778 lbs. in one year.		
Torfrida 3596	50	17 " 6½ "
Colie 8309	25	18 " 4 "
Pyrrha 6100	25	16 " 14½ "
Typha 5870	25	16 " 11 "
Dia 13,658	25	15 " 13 "
True Inwardness 10,262	25	14 " 0 "
Mother Hubbard 10,331	12½	24 " 1½ "
BOMBA 10,330	12½	**21 " 11½** "
Matilda 5th 18,068	12½	16 " 4 "
EUPHONIA 6783	12½	**16** lbs. **0½** oz.
Leah Darlington 13,836	12½	15 " 5½ "
Nazli 10,327	12½	15 " 3½ "
Nimble 22,335	12½	14 " 10 "
Smoky 13,733	12½	14 " 9 "
Jennie Johnson 3d 6782	12½	14 " 0 "
Daisy Morrison 14,035	6¼	25 " 12½ "
Rioter Alphea 10,091	6¼	16 " 7 "
Eupidee's Perfection 20,175	6¼	15 " 4 "
Dove Dee 18,059	6¼	15 " 3 "
Total, 20 *cows*.		

ORANGE PEEL 502 (*F.* 129 *J. H. B.—H. C.*).

Color, orange fawn and white; three small white spots below right flank. Bred by John Arthur, St. Mary's, Jersey. Sire, Clement 115. Dam, Cowslip (F. 330 J. H. B.—H. C.). Dropped February, 1869. Imported by A. Robeson, June 30th, 1870.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Lustre 2062	50	15 lbs. 8½ oz.
Rosa of Bellevue 6954	25	18 " 7½ "
Viva Le Brocq 13,702	25	18 " 3 "
Mary Jane of Bellevue 6956	25	17 " 7 "
Gold Trinket 9518	25	17 " 2 "
Dairy Pride 4th 21,681	25	16 " 0 "
Rose of Oxford 13,469	25	15 " 14½ "
Atricia 6029	25	15 " 3 "
Naomi's Pride 16,475	25	15 " 2 "
Caroline 12,019	25	14 " 8 "
Gilda 2779	25	14 " 6 "
Prize Rose 16,309	18¾	15 " 1 "
Island Star 11,876	12½	21 " 3 "
Florinanna 24,354	12½	17 " 5 "
Milkmaid Felch 12,339	12½	16 lbs. 7½ oz.
Fear Not 2d 6061	12½	16 " 2 "
Lily of Burr Oaks 1101	12½	15 " 13 "
Countess Gasela 9571	12½	15 " 11 "
Grace Felch 8291	12½	15 " 0 "
Charmer 4771	12½	14 " 12 "
Rosebud of Bellevue 7702	12½	14 " 11 "
Magnolia Ridgley 17,269	12½	14 " 8 "
Milkmaid of Burr Oaks 9035	12½	14 " 5 "
Lotchen 19,823	9⅜	16 " 7 "
Young Garenne 3d 13,648	9⅜	16 " 3 "
Niobe of Linwood 11,134	9⅜	14 " 9 "
Cherokee Rose 20,921	6¼	23 " 10 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Jenny Dodo II. 14,448	6¼	21 lbs.	8 oz.
Lady of the Isles 2d 16,652 (rated)	6¼	19 "	11 "
Fan's Grouville Beauty 10,079	6¼	19 "	3 "
Beauty Romeril 26,090	6¼	18 "	9 "
LE BROCQ'S CURFEW 30,697	6¼	18 " / ***15*** "	0 " / ***12½*** "
Fear Not 5059	6¼	17 "	10 "
Lady Velvetine 15,771	6¼	17 "	2 "
Lady Josephine 11,560	6¼	16 "	11¾ "
Corn 10,504	6¼	16 "	2 "
Wakena 19,721	6¼	16 "	0 "
Eclipse 14,427	6¼	15 "	12 "
Les Marais Dell 20,314	6¼	15 "	8 "
Belle Dame 2d 22,043	6¼	15 "	3 "
Queen of Ashantee 14,554	6¼	15 "	2 "
Cicero's Mabel 18,238	6¼	15 "	2 "
Verora 10,766	6¼	15 lbs.	1½ oz.
Daisy Dixie 9469	6¼	15 "	1 "
Jenny Williams 29,058	6¼	15 "	0 "
Medrie Le Brocq 8888	6¼	14 "	7 "
Island Dots 17,023	6¼	14 "	7 "
Embla Brick 15,690	6¼	14 "	3 "
Bella Delaine 10,356	6¼	14 "	2 "
Nervine 25,932	6¼	14 "	1½ "
Birdie Le Brocq 17,263	6¼	14 "	0 "
Elinor Wells 12,060	6¼	14 "	0 "
Le Rosa 10,078	6¼	14 "	0 "
Nutley's Alma 13,581	6¼	14 "	0 "
Carlo's Fancy 14,591	6¼	14 "	0 "
Frances C. Magnet 22,904	4 11/16	14 "	13½ "
Moggie Bright 25,891	3⅛	16 "	6 "
Liberty 2d 16,717	3⅛	14 "	6½ "
Pendule 2d 16,709	3⅛	14 "	6 "
Total, 59 *cows.*			

MONARCH OF ROXBURY 499.

Dropped July 26th, 1869. Bred by Thomas Motley. Sire, John Le Bas 398. Dam, Nellie 289.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Merry Burlington 7600	50	15 lbs.	4 oz.
Topsey Roxbury 7796	50	15 "	0 "
Audrey 1447	50	14 "	0 "
Clover Top 9910	50	14 lbs.	0 oz.
Walkyrie 5708	12½	14 "	1 "
Total, 5 *cows.*			

RIOTER 670.

Color, dark gray brown. Bred by Mr. Alexandre, Jersey. Dropped August, 1869. Imported by P. H. Fowler, November, 1871. Purchased by Silas Betts, of Bloomfield Cottage Farm, Camden, N. J.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Lady Bloomfield 4704	75	14 lbs.	12½ oz.
Duchess of Bloomfield 3653	50	20 "	0½ "
SU LU 4705	50	**17** "	**15** "
Letitia 3977	50	15 "	5 "
Princess Mostar 9700	37½	17 "	3 "
Princess Bowen 9699	25	14 "	12 "
Lorella 12,913	25	14 "	7 "
Lucetta 6856	25	14 lbs.	3 oz.
Elmora Mostar 15,955	18¾	14 "	0 "
ETHLEEL 2d 32,291	12½	**30** "	**15** "
Celeste Cox 12,948	12½	20 "	8 "
Jaquenetta 10,958	12½	14 "	6 "
Leoline 2d 18,315	12½	14 "	4 "
Total, 13 *cows.*			

COLUMBIAD 534.

Bred by A. Le Gallais, Jersey. Dropped on ship Hudson, September 7th, 1869. Imported by Captain Pratt, September 14th, 1869.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Aspirante 9272	50	14 lbs. 7 oz.
PET OF ROSE LAWN 11,326	31¼	18 " 2½ "
		15 " **8½** "
Alluring 5541	25	19 " 5 "
Rose of Rose Lawn 9365	25	16 lbs. 3 oz.
Deoine 6343	25	14 " 0 "
Dark Cloud 9364	12½	15 " 3½ "
Total, 6 *cows.*		

LOPEZ 313.

Imported in dam Amy 595, January 29th, 1869, by H. M. Wellington, Massachusetts. Dropped June 4th, 1869.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Bertha Morgan 4770	50	19 lbs. 6 oz.
Molly Brown 7831	50	16 " 0 "
LYDIA DARRACH 4903	25	**17** " **14** "
Violet of Glencairn 10,221	25	14 " 4 "
May Lankton 15,872	12½	16 " 1½ "
Lydia Darrach 2d 8056	12½	16 " 0 "
Lydia Darrach 3d 10,662	12½	16 " 0 "
Orphean 4636	12½	15 " 7 "
Lydia Darrach 5th 16,577	12½	15 lbs. 0 oz.
NIOBE OF ST. LAMBERT 12,969	6¼	**21** " **4½** "
Belmeda 6229	6¼	18 " 12 "
Olie's Lady Teazle 12,307	6¼	16 " 5 "
Gem of Sassafras 8434	6¼	14 " 3½ "
Total, 13 *cows.*		

TOM DASHER 420.

Dropped January 30th, 1869. Bred by S. W. Robbins, Wethersfield, Conn. Sire, Albert 44. Dam, Flora 420.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Jersey Cream 3151	50	17 lbs. 0 oz.
Olie 4133	50	15 " 0 "
Creamer 2467	50	14 " 1 "
Jersey Cream 3d 8521	37½	16 " 5 "
VALUE 2d 6844	25	**25** " **2$\frac{11}{12}$** "
Peggy Leah 3097	25	18 " 12 "
May Blossom 5657	25	18 " 11 "
Duchess of Argyle 3758	25	14 " 13 "
Jersey Cream 2d 8519	25	14 " 12 "
Gem of Sassafras 8434	25	14 " 3½ "
Katie Bashford 15,982	12½	17 " 0 "
Polly Clover 7052	12½	16 lbs. 15 oz.
Olie's Lady Teazle 12,307	12½	16 " 5 "
May Lankton 15,872	21½	16 " 1½ "
Orphean 4636	12½	15 " 7 "
Cowles' Nonsuch 6199	12½	14 " 12 "
Lady Gray of Hilltop 2d 14,641	12½	14 " 12 "
Lady Gray of Hilltop 3d 14,642	12½	14 " 2 "
Hillside Gem 16,640	6¼	20 " 0 "
Belmeda 6229	6¼	18 " 12 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Cordelia Baker 8814 . .	6¼	17 lbs. 9 oz.	Roll of Honor 13,610 . .	6¼	14 lbs. 12 oz.
Rosona 12,956	6¼	16 " 7 "	Celeste Cox 12,948 . . .	3⅛	20 " 8 "
Ethalka 2d 14,128 . . .	6¼	15 " 0 "	Pet Clover 14,624 . . .	3⅛	16 " 8 "
Phyllis of Hillcrest 9067 .	6¼	14 " 12 "	*Total*, 27 *cows.*		

YOUNG BARON 702.

Color, solid bronze fawn; black points. Bred by Mr. Mallett, Jersey. Dropped 1869. Imported by E. P. P. Fowler, 1871.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Gipsy May 6259	75	17 lbs. 8 oz.	Peggotty H. 8639 . . .	25	15 lbs. 6 oz.
Pearl Armstrong 2670 . .	50	21 " 10 "	Sunny Lass 6033	25	14 " 7 "
Amethyst 2699	50	18 " 0 "	Muezzin 3670	25	14 " 0 "
Arietta 5115	50	15 " 0 "	Lass Rex Alphea 16,965 .	12½	16 " 10¾ "
Bertie Briggs 5213 . . .	50	14 " 4 "			
Duenna's Duchess 5508 .	25	16 " 10 "	*Total*, 10 *cows.*		

MERCURY 432.

Color, solid dark gray, shading to black; black tongue and switch. Sire, Jupiter 93. Dam, Alphea 171. Bred by R. M. Hoe, New York. Dropped October 7th, 1869. Still in service, at sixteen years of age, at the head of the Simpson Herd. Has given from fifty to one hundred per cent. of his blood to twenty-five tested cows. Mercury is the product of full brother and sister, and is a good lesson for those who theorize so energetically against the practice of inbreeding.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Phædra 2561	100	19 lbs. 13 oz.	Idalene 11,841	50	15 lbs. 8½ oz.
Nymphæa 5141 . . .	100	18 " 7½ "	Crust 4775	50	15 " 7 "
Purest 13,730	100	15 " 4 "	Zalma 8778	50	15 " 5 "
Richness 16,536	75	17 " 5 "	Clytemnestra 2455 . . .	50	15 " 3½ "
Marvel 13,734	75	15 " 1 "	Iola 4627	50	15 " 2½ "
Ideal Alphea 18,755 . . .	75	14 " 6 "	Ideal 11,842	50	14 " 12½ "
Alphea Star 16,532 . . .	75	14 " 4½ "	Nimble 22,335	50	14 " 10 "
Alphetta 16,531	75	14 " 2½ "	Hartwick Belle 7722 . .	50	14 " 8 "
Lernella 22,322	75	14 " 1½ "	Vestina 2458	50	14 " 2 "
Alphea Jewell 22,331 . .	75	14 " 0 "	Ballet Girl 18,750 . . .	50	14 " 1 "
Reality 16,537	62½	15 " 3½ "	Zitella 2d 11,922	37½	17 " 8½ "
Smoky 13,733	62½	14 " 9 "	Ceccola 13,608	37½	16 " 13 "
Renown 13,729	62½	14 " 6 "	Malope 2d 11,923 . . .	37½	15 " 10 "
Idaletta 11,843	50	15 " 14½ "	Nazli 10,327	37½	15 " 3½ "
Lerna 3634	50	15 " 12 "	Robinette 7114	37½	14 " 1 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Colie 8309	25	18 lbs.	4 oz.
Bessie S. 5002	25	16 "	0 "
Fillpail 16,530	25	15 "	11 "
Niva 7523	25	15 "	8 "
Forsaken 7520	25	15 "	1 "
Faustine 10,354	25	14 "	14½ "
Bessie Bradford 7269	25	14 "	2 "
Honeydrop 10,033	25	14 "	0½ "
St. Nick's Flora 16,195	25	14 "	0 "
Mother Hubbard 10,331	12½	24 "	1½ "
Little Torment 15,581	12½	23 "	2½ "
BOMBA 10,330	12½	21 "	11½ "
Quachette 17,091	12½	19 "	11½ "
Bertha Black 26,275	12½	17 "	0 "
Matilda 5th 18,068	12½	16 "	4 "
Lily of Maple Grove 5079	12½	16 "	3 "
Corn 10,504	12½	16 lbs.	2 oz.
Referette 15,209	12½	15 "	8 "
Leah Darlington 13,836	12½	15 "	5½ "
Bessie Bradford 2d 7271	12½	15 "	2 "
Verora 10,766	12½	15 "	1½ "
Lucy Lanier 13,053	6¼	18 "	2 "
Lass Rex Alphea 16,965	6¼	16 "	10¾ "
Rioter Alphea 10,091	6¼	16 "	7 "
Eupidee's Perfection 20,175	6¼	15 "	4 "
Dove Dee 18,059	6¼	15 "	3 "
Bronze Leaf 14,902	6¼	15 "	1 "
Goldstraw 3d 14,724	6¼	14 "	12 "
Peggy Ford 21,713	6¼	14 "	10 "
Dia 13,658	3⅛	15 "	13 "
Shiloh Daughter 20,378	$1\frac{9}{16}$	14 "	7⅛ "
Total, 61 cows.			

PIERROT 636.

Color, silver gray fawn; black tongue and tail. Dropped 1869. Imported by S. C. Colt, Hartford, Conn., 1871.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Minneola of Elmarch 8229	50	15 lbs.	15 oz.
Elsie Brown 4021	50	14 "	6½ "
Geranium 3963	50	14 "	0 "
Rosy Kate 10,276	37½	18 "	12 "
Lady Cecilia 24,821	37½	16 "	1 "
Pierrot's Picture 12,481	37½	16 "	0 "
Pierrot's Countess 12,480	37½	14 "	0 "
Pierrot's Lady Bacon 12,482	31¼	16 "	10 "
Geranium 2d 7838	25	26 "	4¾ "
PERCIE 14,937	25	18 "	10 "
		14 "	**6½** "
Jennie of the Vale 9553	25	17 "	7½ "
Colt's La Biche 6399	25	17 "	2½ "
Polly Clover 7052	25	16 "	15 "
Hattie Douglass 24,960	25	16 "	5 "
Fannie Taylor 6714	25	15 "	12 "
Julia Walker 10,133	25	15 "	12 "
Canto 7194	25	15 "	12 "
Ultima 14,456	25	15 "	12 "
Palestina 4644	25	15 "	8 "
Princess of Mansfield 8070	25	15 "	2 "
Bellini's Maid 15,170	25	15 "	1½ "
Little Sister 11,666	25	14 lbs.	12 oz.
New London Gipsy 11,667	25	14 "	8 "
Susie La Biche 3d 15,171	25	14 "	6½ "
Palestine's Last Daughter 12,602	25	14 "	6 "
Lady Fanning 11,169	25	14 "	6 "
Rarity 2d 7724	25	14 "	2 "
Queen Fannie 10,275	25	14 "	2 "
Little Han 8004	25	14 "	0 "
Rosy Kate's Rex 13,192	18¾	18 "	8 "
Celeste Cox 12,948	12½	20 "	8 "
Belmeda 6229	12½	18 "	12 "
Kitty Potter 9893	12½	18 "	5 "
Floret 9959	12½	17 "	6 "
Lida Mullin 9198	12½	16 "	18 "
Lizzie D. 10,408	12½	16 "	15 "
Jersey Cream 3d 8521	12½	16 "	5 "
Lady Hayes 10,136	12½	15 "	12 "
Pierrot's Lady Hayes 11,672	12½	15 "	12 "
Bellini La Biche 15,091	12½	14 "	14½ "
Pawtucket Belle 12,406	12½	14 "	12 "
Yellow Locust 10,679	12½	14 "	10½ "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.		Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Eva of Snipsic 17,650	12½	14 lbs.	1 oz.	Signal Maid 19,361	6¼	15 lbs.	0 oz.
Atlanta's Beauty 12,949	6¼	21 "	3 "	Chautauqua Queen 26,403	6¼	14 "	11 "
Hypathia 2d 14,774	6¼	19 "	13½ "	Leoline 2d 18,315	6¼	14 "	4 "
Pet Clover 14,624	6¼	16 "	8 "	Baby Buttercup 10,888	6¼	14 "	0 "
Olie's Lady Teazle 12,307	6¼	16 "	5 "				
Pinafore 2d 15,072	6¼	15 "	8 "	*Total*, 52 *cows.*			

COWS.

COUCH'S LILY 3237.

Color, light orange fawn; dark shading around eyes; black switch. Dropped February, 1869. Bred by Joseph M. Waters, Cromwell, Conn. Sire, Albert 44. Dam, Lily Dale 3236.

COUCH'S LILY AND TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.		Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Couch's Lily 3237	100	16 lbs.	9 oz.	Rosy Kate's Rex 13,192	12½	18 lbs.	8 oz.
Hepsy 2d 12,008	25	17 "	8 "	Maggie Rex 28,623	12½	17 "	0½ "
Floret 9959	25	17 "	6 "	Sister Rex 13,194	12½	16 "	8 "
Arawana Queen 5368	25	16 "	9 "	Elsie Lane 13,302	12½	15 "	4 "
Princess Bellworth 6801	25	15 "	10½ "	Chautauqua Queen 26,403	12½	14 "	11 "
Usilda 2d 6157	25	15 "	2½ "	Sister Cash 33,987	12½	14 "	10 "
Favorite Rajah Rex 16,153	25	15 "	0 "	Lilley Rex 9852	12½	14 "	7 "
Louvie 3d 6159	25	14 "	13 "	Lass Rex Alphea 16,965	6¼	16 "	10⅝ "
Bell Rex 11,700	25	14 "	10 "	**CARRIE LENA 3d 20,077**	**6¼**	**16 "**	**5 "**
Princess Rose	25	14 "	8 "	Guinevere Sinclair	6¼	16 "	2 "
Jeannie Platt 6005	25	14 "	4 "	Ethalka 2d 14,128	6¼	15 "	0 "
Lottie Rex 18,757	25	14 "	4 "				
Pet Rex 20,166	25	14 "	2½ "				
Kerni Rex 13,671	25	14 "	0 "	*Total*, 25 *cows.*			

1870.

BULLS.

WELCOME, F. 166 J. H. B.—H. C.

White line on left side; tail brown, tongue black. Dropped 1870. Second prize over Jersey 1871. First prize over Jersey 1872.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.		Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Garenne 24,534	50	16 lbs.	3 oz.	Trudie 2d 4084	25	15 lbs.	10 oz.
Lucilla Kent 8892	37½	15 "	10 "	Fan of Grouville 7458	25	15 "	0 "
Fear Not 6059	25	17 "	10 "	Lily of Staatsburg 5427	25	14 "	2½ "
Faith of Oaklands 19,696	25	17 "	4 "	Miss Porter 20,300	18¾	16 "	6 "
Buttercup 17,285	25	16 "	8 "	St. Jeannaise 15,789	18¾	16 "	4 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Eugenie Tourneur 24,532 (rated)	18¾	15 lbs.	2½ oz.
PRINCESS 2d 8046	12½	**46** “	**12½** “
Westphalia 24,384	12½	24 “	9½ “
Ona 7840	12½	22 “	10½ “
Primrose 11,956	12½	21 “	10 “
Daisy of St. Peters 18,175	12½	20 “	5½ “
Oaklands Cora 18,853	12½	19 “	9½ “
Fan's Grouville Beauty 10,079	12½	19 “	3 “
Blue Bell of Maple Grove 10,687	12½	18 “	3 “
LE BROCQ'S CURFEW 30,697	12½	18 “	0 “
		15 “	***12½*** “
Lactine 10,680	12½	17 “	7½ “
Pyrrha 6100	12½	16 “	14½ “
Daisy Queen 9619	12½	16 “	4 “
Young Garenne 3d 13,648	12½	16 “	3 “
Desire 24,360	12½	16 “	3 “
Fear Not 2d 6061	12½	16 “	2 “
Dot Buttercup 16,358	12½	16 “	2 “
Brunette Le Gros 9755	12½	15 “	15 “
Happy Blossom 18,218	12½	15 “	8 “
Satin Bird 16,380	12½	14 “	15½ “
Jenny Le Brocq 9757	12½	14 “	14 “
COCOTTE 11,958	12½	14 “	12 “
		14 “	**6** “
Como Lass 24,369	12½	14 “	9 “
Blonde 2d 9268	12½	14 “	4 “
Ballet Girl 18,750	12½	14 “	1 “
Nell Gwynn 9654	12½	14 “	0 “
Fillpail 2d 24,388	9⅜	25 “	2 “
KHELULA 17,970	9⅜	19 “	8 “
		14 “	**6½** “
King's Trust 18,946	9⅜	18 “	0 “
Granny's Gem 30,406	9⅜	16 “	5½ “
Roxie R. 13,503	9⅜	16 “	0 “
Pendule 2d 16,709	9⅜	14 lbs.	6 oz.
OXFORD KATE 13,646	6¼	**39** “	**12** “
Little Torment 15,581	6¼	23 “	2½ “
Island Star 11,876	6¼	21 “	3 “
Pilot's Veronica 18,917	6¼	20 “	2 “
Floribundus 2d 14,949	6¼	18 “	8 “
Arthur's Mistletoe 11,968	6¼	17 “	11½ “
Daisy Brown 12,213	6¼	17 “	6½ “
Mousy 2d 14,962	6¼	17 “	1 “
Princess of Ashantee 13,467	6¼	16 “	12 “
Dairy Pride 4th 21,681	6¼	16 “	0 “
Rose of Oxford 13,469	6¼	15 “	14½ “
Calington 22,021	6¼	15 “	10 “
Victory 16,379	6¼	15 “	4 “
Queen of Ashantee 14,554	6¼	15 “	2 “
Cicero's Mabel 18,238	6¼	15 “	2 “
Romping Lass 11,021	6¼	15 “	0 “
Beauty 17,414	6¼	15 “	0 “
Lady Fair 22,103	6¼	14 “	12 “
Rosebud of Bellevue 7702	6¼	14 “	10½ “
Nimble 22,335	6¼	14 “	10 “
Miss Huelin 22,296	6¼	14 “	9 “
Scipio's Lively 19,869	6¼	14 “	7 “
Belle Grinnell 3d 16,503	6¼	14 “	2 “
Lizzie C. 7713	6¼	14 “	0 “
Ada Minka 15,562	6¼	14 “	0 “
ETHLEEL 2d 32,291	3⅛	**30** “	**15** “
Queen Neptune 15,501	3⅛	18 “	13½ “
Cetewayo's Silver Bell 18,952	3⅛	17 “	2½ “
Rosona 12,956	3⅛	16 “	7 “
Lotchen 19,823	3⅛	16 “	7 “
Elsie Lane 13,302	3⅛	15 “	4 “
Prize Rose 16,309	3⅛	15 “	1 “
Deletta 21,305	3⅛	14 “	15½ “
Betsona 16,776	3⅛	14 “	3 “
Variella of Linwood 10,954	3⅛	14 “	1 “

Total, 77 cows.

DUKE OF GRAYHOLDT 1035.

Color, solid gray brown; black points. Dropped 1870. Imported from Jersey 1871, by J. V. Prather.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Duenna's Duchess 5508	50	16 lbs.	10 oz.
Verbena of Fernwood 9088	50	15 “	0 “
Morlacchi 2725	50	14 lbs.	0 oz.
Putnam Belle 12,116	37½	14 “	0 “

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Phlox 16,399	25	21 lbs. 11 oz.
Ada S. 18,366	25	16 " 9 "
Sunset of Pleasant View 13,071	25	15 " 2 "
Miss Baden Baden 14,760	25	14 " 14½ "
Sunny Lass 6033	25	14 " 7 "
Mary of Pleasant View 13,448	18¾	14 lbs. 6 oz.
Belle Mardi 18,362	12½	18 " 0½ "
Belle of Lynwood 18,364	12½	17 " 14 "
Lass Rex Alphea 16,965	12½	16 " 10¾ "
Total, 13 cows.		

YANKEE 1003 (*P. 27 J. H. B.—H. C.*).

Dropped 1870. Imported from Jersey August 15th, 1872, by W. B. Dinsmore, New York. Sire, Paddy, F. 97 J. H. B.—C. Dam, Georgette, F. 309 J. H. B.—C.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Cassia 2d 21,307	50	20 lbs. 10¼ oz.
Chloe 4th 4612	50	17 " 4 "
Susie Marshall 5782	50	16 " 2 "
Kitty 5th 3849	50	16 " 0 "
Ida 8th 5429	50	14 " 3 "
Viva Le Brocq 13,702	25	18 " 3 "
Queensborough 24,345	25	17 " 5 "
Belle Dame 2d 22,043	25	15 " 3 "
Fancy Fan 12,657	25	14 " 14 "
Lily of the Valley 7439	25	14 " 0 "
Cleliola 14,042	25	14 " 0 "
Queen of De Soto 12,318	18¾	14 " 13 "
Carlo's Fancy 14,591	18¾	14 " 0 "
Mother Carey 11,476	12½	27 lbs. 1 oz.
Lady of the Isles 2d 16,652 (rated)	12½	19 " 11 "
Mabel of St. Mary's 8627	12½	16 " 10 "
Farmer's Floss 17,773	12½	15 " 11 "
Fall Leaf 8587	12½	14 " 8 "
Adora 18,569	12½	14 " 3 "
Lotchen 19,823	9⅜	16 " 7 "
Viva Le Brocq 13,702	6¼	17 " 7 "
Armon 10,862	6¼	16 " 13½ "
Nibbett 16,625	6¼	14 " 7 "
Belle Grinnell 3d 16,503	6¼	14 " 2 "
Total, 24 cows.		

MOGUL 532.

Dropped February, 1870. Bred by Mr. Payn, St. Martins, Jersey. Imported by S. J. Sharpless, Pennsylvania, January, 1871. Sire, Sultan, F. 58 J. H. B.—H. C.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Rosebud of Allerton 6352	37½	19 lbs. 12 oz.
Belle of Prospect 2d 14,326	25	19 " 0 "
Mary M. Allison 6308	25	20 " 14 "
Calendine 9415	25	17 " 9 "
Leonice 2d 8342	25	16 " 8 "
Corinna 2d 6594	25	16 " 5 "
Bramballetta 10,451	25	16 " 4 "
Lady Alice of Hillcrest 7450	25	16 " 3 "
Thorndale Belle 3d 10,459	25	15 lbs. 15 oz.
Mitten 13,368	25	15 " 11 "
Merry Burlington 7600	25	15 " 4 "
Gledelia 10,524	25	15 " 0 "
Belle Thorne 13,369	25	14 " 11 "
Violet of Glencairn 10,221	25	14 " 4 "
Mary of Gilderoy 11,219	25	14 " 4 "
Queen of Prospect 11,997	25	14 " 4 "
Little Torment 15,581	12½	23 " 2½ "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Niobe's Alpheanette 23,336	12½	22 lbs. 10½ oz.	Alfritha 13,673	12½	15 lbs. 3 oz.
Lady Josephine 11,560 . .	12½	16 " 11½ "	Nutley Silverette 22,410 .	6¼	15 " 12¾ "

Total, 21 *cows*.

NELUSKO 479.

Solid color. Dropped May 20th, 1870. Bred at Ogden Farm, Newport, R. I. Sire, Rajah 340. Dam, Nelly 55.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Maggie May 3255. . . .	50	14 lbs. 2½ oz.	Starkville Beauty 4897 . .	25	14 lbs. 0 oz.
Gilt Edge 2d 4420 . . .	50	14 " 0 "	Atlanta's Beauty 12,949 .	12½	21 " 3 "
Lucky Belle 2d 6037 . .	25	16 " 14 "	Gabrielle Champion 14,102	12½	17 " 8 "
Julia Evelyn 6007 . . .	25	15 " 15½ "	Obella B. 10,575	12½	17 " 4 "
Valerie 6044	25	15 " 13 "	Armon 10,862	12½	16 " 13½ "
Duchess Caroline 3d 6041 .	25	15 " 8 "	**GILT EDGE C.** 12,223 .	12½	**15 " 9½ "**
Bettie Dixon 4527 . . .	25	15 " 0 "	Mountain Lass 12,921 . .	12½	14 " 9 "
Florry Keep 6556 . . .	25	14 " 14 "	Minnie Lee 2d 12,941 . .	12½	14 " 3 "
Coronilla 8367.	25	14 " 9½ "	Therese M. 8364	12½	14 " 2 "
Pride of the Hill 4871 . .	25	14 " 8 "	Vivalia 12,760.	12½	14 " 0 "
Maggie C. 12,216 . . .	25	14 " 6 "	Marpetra 10,284	6¼	14 " 6 "
Maggie May 2d 12,926 . .	25	14 " 6 "	*Total*, 23 *cows*.		

ORANGE PEEL 864.

Color, dark fawn; gray head; black switch; white on belly. Dropped 1870. Bred by John Arthur, Jersey. Brother of Orange Peel 502. Imported 1871, by C. Ridgely, of Hampton, Md.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Valma Hoffman 4500 . .	50	21 lbs. 0 oz.	Mary Norton 13,052 . .	12½	17 lbs. 14 oz.
Kate Pansy 15,177 . . .	50	15 " 1 "	Nelida 2d 8227	12½	15 " 2½ "
Lady Mary Hampton 4861	50	14 " 6 "			
Leonice 2d 8342	25	16 " 8 "	*Total*, 6 *cows*.		

OMAHA 482.

Imported in dam Omoo 1247, by S. J. Sharpless, April 18th, 1870. Dropped June 3d. 1870.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Metah's Queen 4886 . . .	50	17 lbs. 9 oz.	Bryant 4193	50	14 lbs. 8 oz.
Mendota 3d 26,326 . . .	50	15 " 6 "	Metah's Baby 9710 . . .	50	14 " 4 "

Total, 4 *cows*.

MONITOR 878.

Color, solid dark gray; black tongue; mixed switch. Dropped July 8th, 1870. Bred by S. C. Colt, Hartford, Conn. Sire, Rob Roy 17. Dam, Emma 801.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Belle Grinnell 4073	50	18 lbs. 8 oz.	Lady Cecilia 24,821	12½	16 lbs. 1 oz.
White Clover Leaf 4512	50	17 " 15 "	Prince's Bloom 9729	12½	14 " 3 "
Belle Grinnell 3d 16,503	25	14 " 2 "	Hypathia 2d 14,774	6¼	19 " 13½ "
Grinnell Lass 11,859	12½	16 " 10 "			
Sunset 15,130	12½	16 " 2½ "	*Total*, 8 *cows*.		

SON OF ALPHEA 562.

Color, solid; black points. Dropped November 17th, 1870. Bred by R. M. Hoe, New York. Sire, Dolphin 2d 468. Dam, Alphea 171.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Pride of Corisande 5323	50	16 lbs. 0 oz.	Niobe's Alpheanette 23,336	25	22 lbs. 10½ oz.
Gray Therese 5322	50	16 " 0 "	Calpurnia 13,267	25	15 " 3½ "
Silversides 3857	50	14 " 3 "	Alberta Signal 18,611	12½	20 " 11 "
Silver Bell 4313	50	14 " 0 "	*Total*, 7 *cows*.		

ANGELA 1682.

Color, deep fawn, nearly solid. Dropped March 22d, 1870. Bred by L. H. Twaddell, W. Philadelphia, Pa. Sire, Roxbury 247. Dam, Europa 121.

ANGELA AND TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Angela 1682	100	14 lbs. 2 oz.	Lucetta 3917	25	14 lbs. 3 oz.
Duchess of Bloomfield 3653	50	20 " 0½ "	**ETHLEEL 2d** 32,291	12½	**30 " 15** "
SU LU 4705	50	**17 " 15** "	Jaquenetta 10,958	12½	14 " 6 "
Letitia 3917	50	15 " 3½ "	Leoline 2d 18,315	12½	14 " 4 "
Lorella 12,913	25	14 " 7 "	*Total*, 9 *cows*.		

LADY OF THE ISLES, F. 992 J. H. B.—H. C.

Color, light brown and white; white speck on right shoulder; white speck right of setting of tail. Dropped April, 1870.

First prize over Jersey, 1874, 1875, 1876. Sweepstakes and Silver Cup, 1875. Also Sweepstakes Parish Prizes many years.

Bred by J. Arthur, of St. Mary. Sire, Brown Prince, F. 85 J. H. B.—H. C. Dam, Nonsuch, F. 334 J. H. B.—C.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Lady of the Isles 2d 16,652 (rated)	50	19 lbs. 11 oz.
Fear Not 5059	50	17 " 10 "
Lady Velvetine 15,771	50	17 lbs. 2 oz.
Fear Not 2d 6061	25	16 " 2 "
Total, 4 cows.		

1871.

BULLS.

MILO 590.

Color, nearly solid; white fleck on each shoulder, right hip and left flank; black switch and tongue. Dropped March 12th, 1871. Bred by T. J. Hand. Sire, Lawrence 61. Dam, Motto 80.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Allie Minka 2982	50	14 lbs. 6½ oz.
Cigarette 2849	50	14 " 4 "
Muezzin 3670	50	14 " 0 "
Bonnie Yost 7943	25	18 lbs. 2 oz.
Ada Minka 15,562	25	14 " 2 "
Total, 5 cows.		

MARIUS 760.

Color, solid gray; black switch and tongue. Dropped April 23d, 1871. Bred by W. H. Schieffelin, New York. Sire, Willie Boy 434. Dam and granddam, Lady Mary 1148. A model of good breeding, having seventy-five per cent. of Lady Mary 1148, his dam, and showing the largest number of tested descendants of any bull of his era. Another grand lesson upon the true art of inbreeding.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Welma 5942	50	17 lbs. 8 oz.
Chenda 4599	50	15 " 9½ "
Calypris 5943	50	15 " 4½ "
Evri 5282	50	15 " 4 "
Geranium 2d 7838	25	26 " 4¾ "
Tenella 6712	25	22 " 1½ "
Cora of Linwood 12,915	25	22 " 0 "
Croton Maid 5305	25	21 " 11½ "
Optima 6715	25	21 " 8½ "
Œnone 8614	25	18 " 15 "
Vixen 7591	25	17 " 6 "
Beeswax 7805	25	17 lbs. 5 oz.
Bellita 4553	25	17 " 2 "
Valhalla 5300	25	17 " 0 "
Belle of Patterson 5664	25	16 " 6 "
Troth 6139	25	16 " 5 "
Busy Bee 6336	25	16 " 4 "
Fleurette of Linwood 12,918	25	16 " 0 "
Edwina 6713	25	15 " 13 "
Fanny Taylor 6714	25	15 " 12 "
Lisetta Johnson 3d 6782	25	15 " 10 "
Denise 8281	25	15 " 9 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Etiquette 4300	25	15	lbs.	8	oz.
Jewell 3d ——	25	15	"	4	"
Signalana 7719	25	15	"	4	"
Aldarine 5301	25	15	"	1½	"
Jenny Williams 29,058	25	15	"	0	"
Dora Doon 12,909	25	15	"	0	"
Opaline 7590	25	14	"	10	"
Medrie Le Brocq 8888	25	14	"	7	"
Marpetra 10,284	25	14	"	6	"
Litza 6338	25	14	"	3	"
Fandango 12,908	25	14	"	3	"
Romp Ogden 3d 5458	25	14	"	1	"
Comtesse d'Espagna 10,308	25	14	"	0½	"
Élite 4299	25	14	"	0	"
Le Rosa 10,078	25	14	"	0	"
ETHLEEL 2d 32,291	18¾	**30**	"	**15**	"
Signetilia 16,333	18¾	14	"	3½	"
Cherokee Rose 20,921	12½	23	"	10	"
Fadette of Verna 3d 11,122	12½	22	"	8½	"
Celeste Cox 12,948	12½	20	"	8	"
Attractive Maid 16,925	12½	20	"	5	"
Fairy of Verna 2d 10,793	12½	20	"	3¾	"
Hilda A. 2d 11,120	12½	20	"	0	"
Ethleel 18,724	12½	19	"	14	"
Gardiner's Ripple 11,693	12½	19	"	12½	"
EVELINA OF VERNA 10,971	12½	**19**	"	**10½**	"
Tenella 2d 19,521	12½	18	"	12	"
Harmony 2d 17,118	12½	18	"	3	"
Signaldella 24,107	12½	18	"	1¾	"
Bertha Black 26,275	12½	17	"	0	"
Troth Plight 10,258	12½	16	"	4	"
Gazella 3d 9355	12½	16	"	3	"
EUPHONIA 6783	12½	**16**	lbs.	**0½**	oz.
Dahlia ——	12½	16	"	0	"
Rupertina 10,409	12½	15	"	12½	"
Mitten 13,368	12½	15	"	11	"
Pinafore 2d 15,072	12½	15	"	8	"
Friz Cam 14,655	12½	15	"	7	"
Alfritha 13,673	12½	15	"	3	"
Fanny Bugler 19,962	12½	15	"	2	"
Romping Lass 11,021	12½	15	"	0	"
Signal Maid 19,361	12½	15	"	0	"
Earl Cow ——	12½	15	"	0	"
Belle Thorne 13,369	12½	14	"	11	"
Reception 3d 11,025	12½	14	"	10	"
Euphorbia 11,229	12½	14	"	9¾	"
Guinevere Sinclair 11,167	12½	14	"	9	"
Jaquenetta 10,958	12½	14	"	6	"
Lady Clarendon 3d 17,578	12½	14	"	5½	"
Lottie Rex 18,757	12½	14	"	4	"
Variella of Linwood 10,954	12½	14	"	1	"
Sadie's Choice 7979	12½	14	"	0	"
Daisy Hamilton 19,962	12½	14	"	0	"
Jennie Johnson 3d 6782	12½	14	"	0	"
Daisy Morrison 14,035	6¼	25	"	12½	"
Atlanta's Beauty 12,949	6¼	21	"	3	"
Alberta Signal 18,611	6¼	20	"	11	"
PERCIE 14,937	6¼	18	"	10	"
		14	"	**6½**	"
Pansy Patterson 18,612	6¼	15	"	15	"
Frances C. Magnet 22,904	6¼	14	"	13½	"
Duchess of Manchester 20,838	6¼	14	"	0	"
Maquilla 24,043	12½	20	"	1	"
Total, 84 cows.					

GRAND DUKE ALEXIS 1040.

Color, solid squirrel gray; full black points. Imported in dam Victorine La Chaise 2740, by Dr. E. W. Voris, Scarborough, N. Y. Dropped November, 1871.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Chrissy 2d 7720	50	16	lbs.	14	oz.
Polynia 10,753	50	16	"	7	"
Countess of Croton 5307	50	15	"	12	"
Roselaine 7167	50	15	"	1	"
Cosette 3874	50	14	"	10½	"
Hartwick Belle 7723	50	14	lbs.	8	oz.
Corolla 4392	50	14	"	4	"
Tenella 6712	25	22	"	1½	"
Gold Trinket 9518	25	17	"	2	"
Valhalla 5300	25	17	"	0	"

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Belle of Patterson 5664	25	16 lbs. 6 oz.
Rupertina 10,409	25	15 " 12½ "
Azelda 2d 7022	25	15 " 2 "
Aldarine 5301	25	15 " 1½ "
Guinevere Sinclair 11,167	25	14 " 9 "
Alphea Jewell 22,331	25	14 " 0 "
Signetilia 16,333	18¾	14 " 3½ "
Fadette of Verna 3d 11,122	12½	22 " 8½ "
Fairy of Verna 2d 10,793	12½	20 " 3¾ "
Hilda A. 2d 11,120	12½	20 " 0 "
Gardiner's Ripple 11,693	12½	19 " 12½ "
EVELINA OF VERNA 10,971	12½	**19** lbs. **10½** oz.
Tenella 2d 19,521	12½	18 " 12 "
Signaldella 24,107	12½	18 " 1¾ "
Pansy Patterson 18,612	12½	15 " 15 "
Euphorbia 11,229	12½	14 " 9½ "
Litty 8017	12½	14 " 0 "
Sadie's Choice 7979	12½	14 " 0 "
Alberta Signal 18,611	6¼	20 " 11 "

Total, 29 *cows.*

GUY MANNERING 698.

Solid color; white muzzle; black switch. Imported in dam Brunette Lass 1870, by E. P. P. Fowler, January 14th, 1871. Dropped March 24th, 1871.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
FAIR LADY 6723	75	**19** lbs. **1** oz.
May Fair 5184	75	16 " 7 "
Phlox 16,399	50	21 " 11 "
COTTAGE LASS 5352	50	**14** " **8** "
Queen of Nubbin Ridge 14,528	21⅞	17 lbs. 0 oz.

Total, 5 *cows.*

WETHERSFIELD 966.

Color, dark gray and brown; black switch and tongue. Dropped November 27th, 1871. Bred by S. W. Robbins. Sire, Albert 44. Dam, Grinella 2d 1303.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Lady Gray of Hilltop 6850	50	18 lbs. 12 oz.
Summerline 8001	25	18 " 6 "
Cordelia Baker 8814	25	17 " 9 "
Mary Clover 9998	25	14 " 15 "
Lady Gray of Hilltop 2d 14,641	25	14 " 12 "
Deborana 4718	25	14 " 8 "
Lady Gray of Hilltop 3d 14,642	25	14 " 2 "
Jennie of the Vale 9553	25	14 lbs. 6½ oz.
Olie's Lady Teazle 12,307	25	16 " 5 "
PERCIE 14,937	12½	18 " 10 " **14** " **6½** "
Pet Clover 14,624	12½	16 " 8 "
Ethalka 2d 14,128	12½	15 " 0 "
Celeste Cox 12,948	6¼	20 " 8 "
Chautauqua Queen 26,403	6¼	14 " 11 "

Total, 14 *cows.*

IRON BANK 1120.

Nearly solid color; white on belly. Imported in dam Birdie 2611, September 19th, 1871, by A. M. Herkness, Philadelphia. Dropped December 25th, 1871.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Willis 2d 4461	50	16 lbs. 3 oz.	Dora Bell of Shelly's Island 9394	25	17 lbs. 10 oz.
Vaniah 6597	50	15 " 9½ "	Dom Pedro's Julian 8631	25	16 " 0 "
Lebanon Daughter 6106	50	14 " 4 "	Home Matron 6707	25	14 " 0 "
Lebanon Lass 6108	50	14 " 2 "			
Royal Sister 12,457	37½	14 " 11 "			
Blossie Reynolds 6082	25	16 " 3½ "	*Total*, 9 *cows*.		

LEMON, F. 170 J. H. B.

Color, dark brown; white patch between forelegs. Dropped 1871.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Nelly 6456	50	21 lbs. 0 oz.	Bohemian Gipsy 17,452	12½	14 lbs. 11 oz.
Nancy Lee 7618	25	26 " 8½ "	Lizzie C. 7713	12½	14 " 0 "
Miss Vermont 7698	25	16 " 5 "	Variella of Linwood 10,954	6¼	14 " 1 "
Daisy of St. Peters 18,175	25	20 " 5½ "			
Royal Beauty 18,908	12½	15 " 2½ "	*Total*, 8 *cows*.		

PADDY 899.

Solid color; black points. Imported from Jersey by Captain Pratt, November, 1871, at two months old.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Ella of Sidney 4522	50	14 lbs. 7 oz.	Cream of Sidney 17,028	25	17 lbs. 2½ oz.
Rosetta of Sidney 4520	50	14 " 2 "	Hypathia 2d 14,744	12½	19 " 13½ "
Rosalia of Sidney 4521	50	14 " 2 "	Queen of Delaware 17,029	12½	18 " 13 "
Jefferson Albina 12,196	37½	14 " 13 "			
Moberly Creamer 23,051	37½	14 " 5 "	*Total*, 8 *cows*.		

PERTINATTI 713.

Color, neck and head dark; body gray; white points. Dropped September, 1871. Bred by C. L. Sharpless, Philadelphia, Penn. Sire, Pilot, Jr. 141. Dam, Pert 110.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Beauty ——	50	20 lbs. 15 oz.	Kate Gordon 8387	25	15 lbs. 15 oz.
Renalba 4117	50	17 " 4½ "	Petite Mère 8516	25	15 " 13 "
Romp Ogden 2d 4764	50	15 " 5 "	Lucetta 6856	25	14 " 3 "
Pixie 4115	50	14 " 0 "	Daisy Brown 12,213	12½	17 " 6½ "
Roonan 5133	25	20 " 4 "	Dot Buttercup 16,358	12½	16 " 2 "
Leoni 11,868	25	18 " 7 "	Dora Doon 12,909	12½	15 " 0 "
Harmony 2d 17,118	25	18 " 3 "	Fall Leaf 8587	12½	14 " 8 "
Bonnie Yost 7943	25	18 " 2 "	Leoline 2d 18,315	12½	14 " 4 "
Creole Maid 11,017	25	16 " 15 "	Adora 18,659	12½	14 " 3 "
Dudu of Linwood 8336	25	16 " 7½ "			
Fleurette of Linwood 12,918	25	16 " 0 "	*Total, 20 cows.*		

CHIEF JUSTICE 2d 1643.

Color, dark on head and sides; orange twist, light scrotum, white heels, black switch. An inbred Sam Weller bull. Bred by Peter W. Jones, New Hampshire. Dropped November, 1871.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
HILDA D. 6683	100	**21** lbs. 2½ oz.	Hilda 2d 5447	87½	23 lbs. 5 oz.

Total, 2 cows.

COWS.

OONAN 1485.

Color, fawn; white on hind quarters. Bred at Ogden Farm, Newport, R. I. Dropped July 30th, 1871.

OONAN AND TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Oonan 1485	100	22 lbs. 2½ oz.	Callie Nan 7959	50	16 lbs. 2 oz.
Roonan 5133	50	20 " 4 "	*Total, 3 cows.*		

EUROTAS 2454.

Color, dark fawn and gray; black points. Bred by Colonel R. M. Hoe, New York. Sire, Rioter 2d 469. Dam, Europa 176. Dropped August 13th, 1871. Dam of eight bulls and two heifers. Eurotas dropped a calf October 30th, 1879,

and began her notable test for a year November 10th, 1879, her next calf October 24th, 1880, and the test concluded October 15th, 1880, making seven hundred and seventy-eight pounds one ounce of butter in eleven months and six days, with calves a little less than a year apart. She was never fed more than six quarts of grain daily, a mixture of maize, oats and wheat bran, with a few potatoes and the best hay in winter, and the best of pasture in summer.

EUROTAS AND TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.		Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Eurotas 2454	100	22 lbs.	7 oz.	Leah Darlington 13,836	25	15 lbs.	5½ oz.
778 lbs. 1 oz. in one year.				Nazli 10,327	25	15 "	3½ "
Mother Hubbard 10,331	25	24 "	1½ "	Eupidee's Perfection 20,175	12½	15 "	4 "
BOMBA 10,330	25	21 "	11½ "	Dove Dee 18,059	12½	15 "	3 "
Matilda 5th 18,068	25	16 "	4 "				
Dia 13,658	25	15 "	13 "	*Total, 9 cows.*			

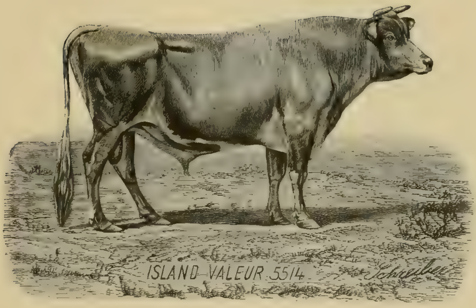
COOMASSIE 11,874 (F. 1442 J. H. B.—H. C.).

Color, brown; figure 7 between hips. Dropped 1871. Imported January 23d, 1881, by S. M. Burnham, Saugatuck, Conn.

Coomassie, with different judges every year, took the following prizes: 1876, first prize over Jersey, young cow class; 1877, first prize over Jersey, young cow class; 1878, first prize over Jersey, champion cow class; 1879, first prize over Jersey, champion cow class; 1880, first prize over Jersey, champion cow class; also four first parish prizes, 1874 to 1876.

TESTS OF COOMASSIE AND DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.		Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Coomassie 11,874	100	16 lbs.	11 oz.	Blonde 2d 9268	25	14 lbs.	4 oz.
St. Jeannaise 15,789	37½	16 "	4 "	Le Rouge 12,405	25	14 "	3 "
PRINCESS 2d 8046	25	**46** "	**12½** "	Lady Young 16,668	25	14 "	0 "
Ona 7840	25	22 "	10½ "	Young Garenne 3d 13,648	18¾	16 "	3 "
Island Star 11,876	25	21 "	3 "	**OXFORD KATE** 13,646	12½	**39** "	**12** "
LE BROCQ'S CURFEW 30,697	25	18 "	0 "	Westphalia 24,384	12½	24 "	9½ "
		15 "	***12½*** "	Little Torment 15,581	12½	23 "	2½ "
Olymph 17,937	25	17 "	8 "	Pilot's Veronica 18,917	12½	20 "	2 "
Daisy Brown 12,213	25	17 "	6½ "	Ethleel 18,724	12½	19 "	14 "
Lady Velvetine 15,771	25	17 "	2 "	Arthur's Mistletoe 11,968	12½	17 "	11½ "
Daisy Queen 9619	25	16 "	4 "	Princess of Ashantee 13,467	12½	16 "	12 "
Desire 24,360	25	16 "	3 "	Miss Porter 20,300	12½	16 "	6 "
Lady Kingscote 26,085	25	15 "	10 "	Fear Not 2d 6061	12½	16 "	2 "
Lady Vertumnus 13,217	25	14 "	10 "	Thaley 14,299	12½	16 "	0 "
Auntybel 12,582	25	14 "	9 "	Ruby Wray ——	12½	16 "	0 "
Como Lass 24,369	25	14 "	9 "	Rose of Oxford 13,469	12½	15 "	14½ "



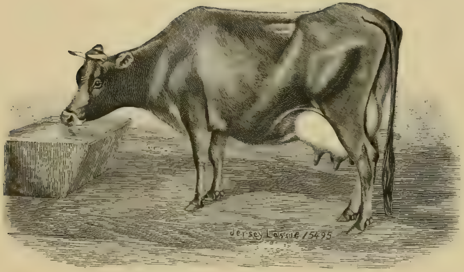
ISLAND VALEUR 5514.

AT 4 YEARS OLD.

Coomassie Type.

CREAM COTTAGE HERD.

J. S. ROGERS, PATERSON, NEW JERSEY.



JERSEY LASSIE 15,945.

Coomassie Type.

HOLLY GROVE HERD.

JOHN I. HOLLY, PLAINFIELD, NEW JERSEY.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Happy Blossom 18,218	12½	15 lbs.	8 oz.
Eugenie Tourneur 24,532 (rated)	12½	15 "	2½ "
Queen of Ashantee 14,554	12½	15 "	2 "
Romping Lass 11,021	12½	15 "	0 "
Lady Fair 22,103	12½	14 "	12 "
Pendule 2d 16,709	12½	14 "	6 "
Nell Gwynn 9654	12½	14 "	0 "
Ada Minka 15,562	12½	14 "	0 "
Gazelle 15,961	12½	14 "	0 "
ETHLEEL 2d 32,291	6¼	**30** "	**15** "
Fillpail 2d 24,388	6¼	25 "	2 "
Maquilla 24,043	6¼	20 "	1 "
KHELULA 17,970	6¼	19 "	8 "
		14 "	**6½** "
King's Trust 18,946	6¼	18 lbs.	0 oz.
Toltec's Fancy 7172	6¼	17 "	6 "
Rosona 12,956	6¼	16 "	7 "
Moggie Bright 25,891	6¼	16 "	6 "
Granny's Gem 30,406	6¼	16 "	5¼ "
Roxie R. 13,503	6¼	16 "	0 "
Les Marais Dell 20,314	6¼	15 "	8 "
Elsie Lane 13,302	6¼	15 "	4 "
Cicero's Mabel 18,238	6¼	15 "	2 "
Prize Rose 16,309	6¼	15 "	1 "
Deletta 21,305	6¼	14 "	15½ "
Liberty 2d 16,717	6¼	14 "	6½ "
Betsona 16,776	6¼	14 "	3 "

Total, 57 *cows.*

JERSEY BELLE OF SCITUATE 7828.

STORY OF THE MODEL COW.

> "I think Nature hath lost the mould
> Where she her shape did take."—*Old Poet.*

In a little hamlet of eastern Massachusetts, on a cold Sunday in February, 1871, two good dames in the village church at the hour of noon, while partaking of their lunch, left the discussion of the morning sermon and all kindred subjects to talk about that which all good housewives allow to have a pre-eminent importance in conversational culture—that is, golden, sweet-flavored butter.

One of these good dames informed her neighbor that their "Jersey cow Jenny had last week made eleven pounds of butter as yellow as California gold, being fed only upon good hay and beets."

"What a wonder! We would like to own something as choice as that, for it is something we have not been able to do—make yellow butter in winter."

The charmed listener told the story of Jenny, the golden-butter cow, to her son, on arriving home, and he then determined, if possible, to procure some of the progeny of such a cow, so that he could with certainty make yellow butter in winter. By an effort to secure the next calf he was agreeably surprised to receive as a present a fine heifer soon after its birth, July, 1871. The heifer was named Jersey Belle of Scituate. As the time approached when the heifer should have her first calf a neighbor who chanced to be in the barn examining her points exclaimed to the owner: "Have you ever examined this heifer? She is all swollen under her belly clear to her shoulder, and has an enormous bag!"

After calving her milk was mixed with that of another cow, a Shorthorn grade,

and the two cows yielded six hundred and four pounds of butter that year, but it was suspected that the little heifer made the major part of the butter. The next year the milk was kept separate and the quality of Jersey Belle as a butter-yielder demonstrated. When six years old her udder measured five feet one inch in circumference, in after years five feet three inches. On March 5th, 1877, she made three pounds six ounces of butter, and for the week ending March 11th twenty-one pounds five ounces, and for the year ending March 5th, 1878, seven hundred and five pounds of butter. For five months she averaged nineteen pounds a week.

In 1879 her greatest weekly yield was twenty-two pounds thirteen ounces. In the year 1880 her greatest weekly yield was twenty-five pounds three ounces. In the color of her butter she was very remarkable. In midwinter it was of so rich a golden hue that those not familiar with it supposed it artificially colored.

The yield of Jersey Belle of Scituate is also the largest ever known for kind and quality of feed. During her six-year-old test she received in summer, pasture in cranberry marsh-land and two quarts of wheat bran at night. In winter her feed was rowen hay and two quarts of bran daily. She was an enormous feeder, with an almost insatiable appetite, and wonderful powers of mastication, digestion and assimilation. Her feed during her best week's test was for the first four days: pasture by day; at night cut grass, with one quart corn meal and two quarts wheat shorts; last three days, pasture by day; cut grass at night, with two quarts corn meal and two quarts wheat shorts, or three and three seventh quarts of grain daily for the seven days.

This cow was, in almost every point, the ideal of perfection. Her breeding was according to one of the best formulas for inbreeding, the product of sire and daughter, her sire having been the product of brother and sister.

Her udder was very large and of the perfect spheroidal type, the sole on a line with the belly, and giving in combination with the barrel the best possible illustration of the term "wedge-shape." The udder was of a nankeen color. The teats were perfect in pattern and placing and of a mahogany color. I am unable to give the dimensions of the fore escutcheon. The fore-veins were the most remarkable of any cow ever described. There were two very large tortuous veins on each side of the belly and a fifth shorter vein, two large fountains on each side where but one is usually found, and one large vein upon either side extending along the belly to the chest and upward to the shoulder, terminating about midway between the elbow and the point of the withers.

The hind escutcheon was of the Limousine type, but without buttock feathers, and therefore equivalent to a first order curveline, being very wide and deep on the thighs.

Her skin color was a rich orange within the ear and annotto tint beneath all the white patches.

She had a clean, thoroughbred appearance. The rump was remarkable for height, and, being level, gave a fine setting to the tail, which hung plumb, without touching the cow at any part.

The bony structure was of the finest quality, as shown by the thin flat thigh, making a striking contrast with the broad surface of the full udder. The hide was mellow and delightful to the touch, remarkably loose about the belly, and the navel was a most notable feature, because of its great size, observed by many while she was a young heifer.

The hips were of great breadth and of the finest shape and quality; the back of great breadth at the loins; the neck long, thin and clean; the eyes full and placid; the temper most notable for equanimity, being wholly occupied with feeding or chewing the cud; the head small, the muzzle fine, the masticatory muscles round and very prominent.

The cow gave the following measurements at ten years of age:

Weight, 952 pounds; udder, 5 feet, 3 inches; height at rump, 54 inches; length of tail and switch, 54 inches; height at withers, 50 inches; girth at shoulder, 68 inches; girth at navel, 92 inches (not with calf); length of back, 55 inches; width of hips, 21 inches; length of neck, 28 inches; girth of neck, 47 inches (at shoulders); girth of neck at throat, 27 inches; girth of muzzle, 16 inches; breadth at eyes, 8 inches; breadth of crown, 7 inches; length of head, 18 inches; width of hind escutcheon across the thighs and udder, 18 inches.

The cow was a marvel for symmetry and beauty of proportions, and well worthy to be ranked as the very choicest model of perfection.

Not until she made a large record was she registered in the American Jersey Cattle Club Herd Register.

Mr. Charles O. Ellms, of Scituate, Mass., who owned her, refused an offer of twenty thousand ($20,000) dollars for her, and afterward was urged by the late Mr. C. L. Sharpless to name the sum which he would be willing to take for her; but he had determined to keep her as long as she lived, and refused to name any price for her. While yet a heifer he had offered her to a neighbor for thirty ($30) dollars, who thought the animal not worth the money.

It will ever be a cause for regret that she was not mated with some of the great bulls, such as Albert 44, St. Helier 45, Sam Weller 271, Mercury 432, Marius 760, Chief Justice 2d 1643, Signal 1170, Stoke Pogis 3d 2238, or Landseer 331. There never existed a finer model for the experimenting hand of a skilful breeder. Jersey Belle was a perpetual milker, and gave twenty-five pounds of milk on the morning of the day of her last calving.

Her color was strawberry fawn and white; white saddle on withers; white across hips, on belly, sides and legs; white star and switch, with indigo margin bordering the white markings. Bred by E. D. Sohier, Boston, Mass. Sire and grandsire,

Victor 3550. Dam, Jenny 7827. Dropped July 10th, 1871. Died August, 1881, of colostrum apoplexy.

JERSEY BELLE OF SCITUATE AND HER DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name	Blood, Per Cent.	Butter Yield in Seven Days.
Jersey Belle of Scituate 7828	100	25 lbs. 3 oz.	Lass of Scituate 9555	50	15 lbs. 14 oz.
Minnie of Scituate 17,829	75	14 " 14½ "	Scituate of Woronoco 18,840	12½	24 " 14 "
Belle of Scituate 7977	50	18 " 0 "	Lily Scituate 12,665	12½	24 " 9½ "
Pauline's Vivienne 11,305	50	16 " 13 "	*Total*, 7 *cows*.		

NORAJAH 812.

Color, nearly solid fawn; white spot in forehead; white spot back of left shoulder. Dropped June 10th, 1872. Bred at Ogden Farm, Newport, R. I. Sire, Rajah 340. Dam, Nora 434.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Hazen's Nora 4751	50	20 lbs. 4 oz.	Little Han 8004	50	14 lbs. 0 oz.
Arawana Buttercup 6052	50	15 " 5 "	Arawana Queen 5368	25	16 " 9 "
Arawana Poppy 6053	50	15 " 2 "	*Total*, 5 *cows*.		

GREY PRINCE, F. 168 J. H. B.—C.

Color, solid silver gray; black points. Dropped January, 1872. Bred by W. Alexandre, Trinity, Island of Jersey. Sire, Grey of the West, F. 1317 J. H. B.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Beauty of the Grange 7502	50	23 lbs. 9 oz.	Eveline of Jersey 6781	50	18 lbs. 6 oz.

Total, 2 *cows*.

JACQUOT, P. 63 J. H. B.—C.

Color, light gray and white. Dropped 1872.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Reception 8557	50	21 lbs. 4½ oz.	Reception 3d 11,025	25	14 lbs. 10 oz.
Dora Neptune 20,318	25	20 " 0½ "	*Total*, 3 *cows*.		

NOBLE 901.

Solid color; black points. Imported in dam Fanny of Babylon 2345, by Captain Pratt, November 18th, 1871. Dropped June 10th, 1872. Bred by J. F. Journeaux, St. Martin, Jersey. Sire, Noble, F. 104 J. H. B.—H. C.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Queen of Delaware 17,029	75	18 lbs. 13 oz.	Desire 9654	50	16 lbs. 3 oz.
Cream of Sidney 17,028 .	75	17 " 2½ "	Daisy of Chenango 18,582 .	50	14 " 7 "

Total, 4 cows.

PIERROT 2d 1669.

Color, light fawn and white. Dropped March 10th, 1872. Bred by S. C. Colt, Hartford, Conn.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Rosy Kate 10,276 . . .	75	18 lbs. 12 oz.	Lizzie D. 10,408	25	16 lbs. 15 oz.
Julia Walker 10,133 .	50	15 " 12 "	Pierrot's Lady Bacon 12,482	25	16 " 10 "
Palestina 4644 . . .	50	15 " 8 "	Lida Mullin 9198 . .	25	16 " 8 "
Princess Mansfield 8070 .	50	15 " 2 "	Pierrot's Picture 12,481 .	25	16 " 0 "
Little Sister 11,666 . .	50	14 " 12 "	Lady Hayes 10,136 . . .	25	15 " 12 "
New London Gipsy 11,667	50	14 " 8 "	Pierrot's Lady Hayes 11,672	25	15 " 12 "
Queen Fanny 10,275 . .	50	14 " 2 "	Pawtucket Belle 12,406 .	25	14 " 12 "
Rosy Kate's Rex 13,192 .	37½	18 " 8 "	Pierrot's Countess 12,480 .	25	14 " 0 "
Belmeda 6229	25	18 " 12 "	Hypathia 2d 14,774 . . .	12½	19 " 13½ "
Floret 9959.	25	17 " 6 "	*Total, 19 cows.*		

RALPH 957.

Dropped September 1st, 1872. Bred by O. S. Hubbell, Stratford, Conn. Sire, St. Helier 45. Dam, Ibi 671.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Mhoon Lady 6560 . . .	50	17 lbs. 3 oz.	Florry Keep 6556 . . .	50	14 lbs. 14 oz.
Cenie Wallace 2d 6557 .	50	15 " 4½ "	*Total, 3 cows.*		

LORD LISGAR 1066.

Solid color. Dropped May 5th, 1872. Bred by S. S. Stephens, Montreal, Canada. Sire, Victor Hugo 197. Dam, Pauline 494.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Carrie Pogis 22,568	62½	15	lbs.	9	oz.
Sweetbrier of St. Lambert 5481	50	22	"	2¼	"
Jolie of St. Lambert 5126	50	15	"	13½	"
Lucy Dale 5129	50	15	"	12	"
Duchess of St. Lambert 5111	50	15	"	11	"
Clematis of St. Lambert 5478	50	14	"	3	"
Bonnie Fawn 6190	50	14	"	0	"
Rose of St. Lambert 20,426	28⅛	21	"	3½	"
IDA OF ST. LAMBERT 24,990	25	**30**	"	**2¼**	"
Flower of Glen Rouge 17,560	25	23	"	14¾	"
Nora of St. Lambert 12,962	25	22	"	0	"
NIOBE OF ST. LAMBERT 12,969	25	**21**	"	**4½**	"
Brenda of Elmhurst 10,762	25	20	"	8	"
Honeymoon of St. Lambert 11,221	25	20	"	5¼	"
Rioter's Maggie 22,530	25	18	"	6½	"
Melia Ann 5444	25	18	"	0½	"
Cowslip of St. Lambert 8349	25	17	"	12	"
Minnette of St. Lambert 9774	25	17	"	4	"
Baronetti 8425	25	16	"	14	"
Chamomilla 7552	25	16	"	10	"
Diana of St. Lambert 6636	25	16	"	8	"
Cill of Glen Rouge 13,818	25	16	lbs.	6	oz.
Moss Rose of St. Lambert 5114	25	15	"	8½	"
May Day Stoke Pogis 28,383	25	15	"	3	"
Coquette of Glen Rouge 17,559	25	15	"	1½	"
Honeysuckle of St. Anne's 18,674	25	14	"	14	"
Bonnie 2d 5742	25	14	"	11½	"
Gem of St. Cloud 7342	25	14	"	8½	"
Rioter's Beauty 14,894	18¾	14	"	0	"
MARY ANNE OF ST. LAMBERT 9770	12½	**36**	"	**12¼**	"
MERMAID OF ST. LAMBERT 9771	12½	**25**	"	**13½**	"
Daisy Morrison 14,035	12½	25	"	12½	"
NAIAD OF ST. LAMBERT 12,695	12½	**22**	"	**2½**	"
RIOTER PINK OF BERLIN 23,665	12½	**19**	"	**12**	"
Crocus of St. Lambert 8351	12½	17	"	12	"
Judith Coleman 11,391	12½	17	"	5	"
Obella B. 10,575	12½	17	"	4	"
Rioter's Nora 21,778	12½	15	"	9	"
Maggie Sheldon 23,583	12½	15	"	3	"
Aleph Judea 11,389	12½	15	"	1¾	"
Rioter's Ruth 14,882	12½	14	"	12	"
Uinta 5743	12½	14	"	10	"

Total, 42 *cows*.

STOKE POGIS 1259.

Color, dark fawn; black points. Bred by E. J. Coleman, Stoke Park, Buckinghamshire, England. Dropped 1872. Sire and grandsire, Young Rioter 751 E. H. B. Dam, Essay. Stoke Pogis had eighty-one and a quarter per cent. of the blood of his

sire. Imported by Peter Leclair, Winooski, Vt., July 19th, 1873. A pure Dauncey bull and the result of forty-six years of systematic inbreeding, begun in the year 1826 and carried out by Philip Dauncey, Horwood Rectory Farm, Winslow, Bucks, England.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
La Petite Mère 2d 12,810	75	16 lbs.	7 oz.
MATILDA 4th 12,816	50	**21** “	**8½** “
Minnie of Oxford 12,806	50	16 “	0 “
La Belle Petite 5472	50	15 “	8 “
Marjoram 2d 12,805	50	15 “	0 “
Mintha 12,812	50	15 “	0 “
MARY ANNE OF ST. LAMBERT 9770	25	**36** “	**12½** “
IDA OF ST. LAMBERT 24,990	25	**30** “	**2½** “
MERMAID OF ST. LAMBERT 9771	25	**25** “	**13½** “
NAIAD OF ST. LAMBERT 12,965	25	**22** “	**2½** “
Nora of St. Lambert 12,962	25	22 “	0 “
NIOBE OF ST. LAMBERT 12,969	25	**21** “	**4½** “
Brenda of Elmhurst 10,762	25	20 “	8 “
Honeymoon of St. Lambert 11,221	25	20 “	5½ “
RIOTER PINK OF BERLIN 23,665	25	**19** “	**14** “
Cowslip of St. Lambert 8349	25	17 “	12 “
Crocus of St. Lambert 8351	25	17 lbs.	12 oz.
Minnette of St. Lambert 9774	25	17 “	4 “
Diana of St. Lambert 6636	25	16 “	8 “
Maggie of St. Lambert 9776	25	16 “	3 “
Moth of St. Lambert 9775	25	16 “	2 “
Mary Hinman 17,619	25	15 “	11½ “
Rioter's Nora 21,778	25	15 “	9 “
Mavourneen of St. Lambert 9777	25	15 “	7 “
May Day Stoke Pogis 28,383	25	15 “	3 “
Cupid of Lee Farm 5997	25	14 “	6 “
Nancy of St. Lambert 12,964	25	14 “	5 “
Rioter's Beauty 14,894 (two years)	18¾	14 “	0 “
Rose of St. Lambert 20,426	12½	21 “	3½ “
Rioter's Maggie 22,530	12½	18 “	6½ “
Carrie Pogis 22,568	12½	15 “	9 “
Maggie Sheldon 23,583	12½	15 “	3 “
Rioter's Ruth 14,882	12½	14 “	12 “

Total, 33 *cows.*

DOCTOR H. 2132.

Color, fawn and white. Dropped December 11th, 1872. Bred by Charles Huston, Coatesville, Pa. Sire, St. Malo, Jr. 733. Dam, Julia 2d 4902.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	
Lydia Darrach 2d 8056	75	16 lbs.	0 oz.
Lydia Darrach 3d 10,662	75	16 “	0 “
Lydia Darrach 5th 16,577	75	15 lbs.	0 oz.
LYDIA DARRACH 4903	50	**17** “	**14** “

Total, 4 *cows.*

COWS.

MARJORAM 3239.

Color, silver gray fawn; full black points. Bred by William G. Duncan, Bradwell, Buckinghamshire, England. Sire, Dr. Syntax. Dam, Magnet. Both sire and dam were descended from stock from the Dauncey herd, at Winslow, and consequently Marjoram 3239 was of kindred blood with Stoke Pogis 1259. Dropped April, 1872. Imported by Peter Leclair, Winooski, Vt., July 19th, 1873. Marjoram was considered by Mr. Duncan the finest and handsomest heifer he ever bred.

MARJORAM 3239 AND TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Marjoram 3239	100	16	lbs.	0	oz.
Marjoram 2d 12,805	50	15	"	0	"
MARY ANNE OF ST. LAMBERT 9770	25	36	"	12½	"
IDA OF ST. LAMBERT 24,990	25	30	"	2½	"
MERMAID OF ST. LAMBERT 9771	25	25	"	13½	"
NAIAD OF ST. LAMBERT 12,965	25	22	"	2½	"
Nora of St. Lambert 12,962	25	22	"	0	"
NIOBE OF ST. LAMBERT 12,969	25	21	"	4½	"
Brenda of Elmhurst 10,762	25	20	"	8	"
Honeymoon of St. Lambert 11,221	25	20	"	5½	"
RIOTER PINK OF BERLIN 23,665	25	19	"	4	"
Cowslip of St. Lambert 8349	25	17	"	12	"
Crocus of St. Lambert 8351	25	17	"	12	"
Minnette of St. Lambert 9774	25	17	"	4	"
Diana of St. Lambert 6636	25	16	lbs.	8	oz.
Maggie of St. Lambert 9776	25	16	"	3	"
Moth of St. Lambert 9775	25	16	"	2	"
Minnie of Oxford 12,806	25	16	"	0	"
Mary Hinman 17,619	25	15	"	11½	"
La Petite Mère 2d 12,810	25	15	"	11	"
Rioter's Nora 21,778	25	15	"	9	"
Mavourneen of St. Lambert 9777	25	15	"	7	"
May Day Stoke Pogis 28,383	25	15	"	3	"
Cupid of Lee Farm 5997	25	14	"	6	"
Nancy of St. Lambert 12,964	25	14	"	5	"
Rioter's Beauty 14,894 (two years)	18¾	14	"	0	"
Rose of St. Lambert 20,426	12½	21	"	3½	"
Rioter's Maggie 22,530	12½	18	"	6½	"
Carrie Pogis 22,568	12½	15	"	9	"
Maggie Sheldon 23,583	12½	15	"	3	"
Mintha 12,812	12½	15	"	0	"

Total, 31 *cows.*

LUCKY BELLE 2214.

Nearly solid color. Sire, Albert 44. Dam, Pansy 6th 38. Bred by S. W. Robbins, Wethersfield, Conn. Dropped February 13th, 1872.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Oktibbeha Duchess 4422	50	17	lbs.	4	oz.
Lucky Belle 2d 6037	50	16	"	14	"
Maggie May 3255	50	14	"	2½	"
Valerie 6044	25	15	"	13	"
Maggie C. 12,216	12½	14	lbs.	6	oz.
Maggie May 2d 12,926	12½	14	"	6	"

Total, 6 *cows.*

MINK 2548.

Bred by Thomas Motley, Massachusetts. Dropped March 10th, 1872.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Mink 2d 3890	50	19 lbs. 11 oz.
Mink 3d 4868	50	14 " 9 "
Mhoon Lady 6560	25	17 " 3 "
Julia Evelyn 6007	25	15 " 15½ "
Marie C. Magnet 22,903	25	15 lbs. 8 oz.
Frances C. Magnet 22,904	25	14 " 13½ "
Therese M. 8364	12½	14 " 2 "
Total, 7 cows.		

BUFFER 2055.

Color, solid; black tongue; black and gray points. Dropped May 11th, 1873. Bred by R. H. Stephens. Sire, Lord Monck 304. Dam, Amelia 484.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Moss Rose of St. Lambert 5114	50	15 lbs. 8½ oz.
Pearl of St. Lambert 5527	50	14 " 2 "
MARY ANNE OF ST. LAMBERT 977	25	36 " 12½ "
MERMAID OF ST. LAMBERT 9771	25	25 " 13½ "
NAIAD OF ST. LAMBERT 24,965	25	22 " 2½ "
RIOTER PINK OF BERLIN 23,665	25	19 " 14 "
Crocus of St. Lambert 8351	25	17 " 12 "
Judith Coleman 11,391	25	17 lbs. 5 oz.
Moth of St. Lambert 9775	25	16 " 2 "
Aleph Judea 11,389	25	15 " 1¾ "
Coquette of Glen Rouge 17,559	25	15 " 1½ "
Honeysuckle of St. Anne's 18,674	25	14 " 14 "
Rose of St. Lambert 20,426	12½	21 " 3½ "
Rioter's Ruth 14,882	12½	14 " 12 "
Rioter's Beauty 14,894	12½	14 " 0 "
Total, 15 cows.		

HAMILTON 1074.

Color, gray; white spot behind right shoulder and on left side and flank; black switch and tongue. Dropped May 24th, 1873. Bred by T. J. Hand. Sire, Marius 760. Dam, Emily Hampton 1912.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Bellita 4553	50	17 lbs. 2 oz.
Lisetta Johnson 5321	50	15 " 10 "
Etiquette 4300	50	15 " 8 "
Élite 4299	50	14 lbs. 0 oz.
Pinafore 2d 15,072	25	15 " 8 "
EUPHONIA 6783	25	16 " 0½ "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Daisy Hamilton 18,301	25	14 lbs. 0 oz.	Lottie Rex 18,757	12½	14 lbs. 4 oz.
Daisy Morrison 14,035	12½	25 " 12½ "	Jennie Johnson 3d 6782	12½	14 " 0 "
PERCIE 14,937	12½	{ 18 " 10 " / 14 " 6½ "	*Total*, 11 *cows.*		

1873.

BULLS.

ALDINE 1136.

Sire, Nelusko 479. Dam, Gazelle of Mobile. Bred by W. B. Montgomery, Alabama. Dropped July 7th, 1873.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Lucky Belle 2d 6037	50	16 lbs 14 oz.	Minnie Lee 2d 12,941	25	14 lbs. 3 oz.
Julia Evelyn 6007	50	15 " 15½ "	Therese M. 8364	25	14 " 2 "
Duchess Caroline 3d 6039	50	15 " 8 "	Gilt Edge 2d 4420	25	14 " 0 "
Bettie Dixon 4527	50	15 " 0 "	Coronilla 8367	12½	14 " 9½ "
Starkville Beauty 4897	50	14 " 0 "	Marpetra 10,284	12½	14 " 6 "
Gabrielle Champion 14,102	25	17 " 8 "	Maggie C. 12,216	12½	14 " 6 "
Armon 10,862	25	16 " 13½ "	Maggie May 2d 12,926	12½	14 " 6 "
GILT EDGE C. 12,223	25	15 " 9½ "	Vivalia 12,760	12½	14 " 0 "
Mountain Lass 12,921	25	14 " 9 "	*Total*, 17 *cows.*		

THE HUB 1009.

Dropped March 9th, 1873. Bred by C. S. Sargent.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Mink 2d 3890	50	19 lbs. 11 oz.	Julia Evelyn 6007	25	15 lbs. 15½ oz.
Oktibbeha Duchess 4422	50	17 " 4 "	Valerie 6044	25	15 " 13 "
Dairy 2d 5891	50	15 " 5 "	Dairy C. 12,227	12½	15 " 0½ "
Mink 3d 4868	50	14 " 9 "	Marpetra 10,284	12½	14 " 6 "
Adora 18,569	50	14 " 3 "	Therese M. 8364	12½	14 " 2 "
Mhoon Lady 6560	25	17 " 3 "	*Total*, 11 *cows.*		

IKE FELCH 1292.

Color, solid dark brown. Bred by Moses Ellis. Dropped May 18th, 1873.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Milkmaid Felch 12,339	50	16 lbs. 7½ oz.
Lily of Burr Oaks 1101	50	15 " 13 "
Grace Felch 8291	50	15 " 0 "
Milkmaid of Burr Oaks 9035	50	14 lbs. 5 oz.
Wakena 19,721	12½	16 " 0 "

Total, 5 cows.

REMARKABLE (F. 229 J. H. B.—C.)

Solid color; black points. Dropped April, 1873. Double grandson of Orange Peel 502. Sire, Orange Peel 2d (P. 36 J. H. B.—H. C.). Dam, Young Rose (P. 43 J. H. B.—H. C.).

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Rosa of Bellevue 6954	50	18 lbs. 7½ oz.
Mary Jane of Bellevue 6956	50	17 " 7 "
Countess Gasella 9571	50	15 " 11 "
Caroline 12,019	50	14 " 8 "
Rosebud of Bellevue 7702	25	14 lbs. 11 oz.
Cherokee Rose 20,921	12½	23 " 10 "

Total, 6 cows.

CHAMPION OF AMERICA 1567.

Color, solid brown; full black points. An inbred Pansy bull. Sire, May Boy 705. Dam, Pansy 1019. Bred by John H. Sutliff, Bristol, Conn. Dropped April 17th, 1873.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Gabrielle Champion 14,102	50	17 lbs. 8 oz.
Silveretta 6852	50	16 " 9 "
Princess Sheila 7279	50	16 " 4½ "
Tobira 8400	50	15 " 13 "
GILT EDGE C. 12,223	50	15 " 9½ "
Marie C. Magnet 22,903	50	15 " 8 "
Champion's Chloe 12,225	50	15 " 5½ "
Dairy C. 12,227	50	15 " 0½ "
Coronilla 8367	50	14 " 9½ "
Maggie C. 12,216	50	14 " 6 "
Maggie May 2d 12,926	50	14 " 6 "
Lady Greville 12,930	50	14 lbs. 6 oz.
Minnie Lee 2d 12,941	50	14 " 3 "
Jessie Leavenworth 8248	50	14 " 2 "
Webster's Pet 4103	50	14 " 2 "
Therese M. 8364	50	14 " 2 "
Frances C. Magnet 22,904	25	14 " 13½ "
Lady Gray of Hilltop 2d 14,641	25	14 " 12 "
Bell Rex 11,700	25	14 " 10 "
Lady Gray of Hilltop 3d 14,642	25	14 " 2 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Clara C. Magnet 31,563	25	14 lbs. 11 oz.	La Pera 2d 13,404	12½	14 lbs. 8 oz.
Hurrah Pansy 12,153	25	14 " 1½ "	Lilley Rex 9852	12½	14 " 7 "
Baby Buttercup 10,888	25	14 " 0 "	Celeste Cox 12,948	6¼	20 " 8 "
Hillside Gem 16,640	12½	20 " 0 "			
Chautauqua Queen 26,403	12½	14 " 11 "	*Total*, 28 *cows*.		

SIGNAL 1170.

Color, solid mulberry fawn with gray saddle. Rich orange amber horns. Sire, Marius 760. Dam, Pansy Morris 2060. Bred by John T. Foote, Morristown, N. J. Dropped August 27th, 1873.

This bull inherited the butter qualities of a rare line of ancestors, including Pansy 8, Paterson 11, Pansy 6th 38, Albert 44, Lady Mary 1148, and Marius 760. Transferred to Mr. James A. Hayt, of Patterson, N. Y., he produced only fourteen daughters, and was killed by his owner before his signal qualities were known, because he sired so many bulls. It is not stated what proportion of his progeny were males. It would be well to preserve all statistics in regard to the sexes, in order to get a clue to breeding for sex. It would also be a matter of interest to know if the greatest bulls, like some of the wonderful cows, produce a majority of males. Of his fourteen daughters, eleven appear in the accompanying table, with an average weekly test of eighteen pounds eleven and nineteen forty-fourth ounces. Two of the other three met with injuries which caused a loss in one of three quarters of the udder and half the udder in the other, only one sound daughter remaining untested. Twenty-two granddaughters and great-granddaughters average seventeen pounds eleven and one fourth ounces in weekly tests.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Geranium 2d 7838	50	26 lbs. 4¾ oz.	Celeste Cox 12,948	25	20 lbs. 8 oz.
Tenella 6712	50	22 " 1½ "	Fairy of Verna 2d 10,793	25	20 " 3¾ "
Croton Maid 5305	50	21 " 11½ "	Hilda A. 2d 11,120	25	20 " 0 "
Optima 6715	50	21 " 8½ "	Gardiner's Ripple 11,693	25	19 " 12½ "
Œnone 8614	50	18 " 15 "	**EVELINA OF VERNA** 10,971	25	**19 " 10½ "**
Valhalla 5300	50	17 " 0 "	Tenella 2d 19,521	25	18 " 12 "
Belle of Patterson 5664	50	16 " 6 "	Harmony 2d 17,118	25	18 " 3 "
Edwina 6713	50	15 " 13 "	Signaldella 24,107	25	18 " 1¾ "
Fanny Taylor 6714	50	15 " 12 "	Rupertina 10,409	25	17 " 1½ "
Signalana 7719	50	15 " 4 "	Gazella 3d 9355	25	16 " 3 "
Aldarine 5301	50	15 " 1½ "	Dahlia ——	25	16 " 0 "
Signetilia 16,333	37½	18 " 5½ "	Signal Maid 19,361	25	15 " 0 "
Fadette of Verna 3d 11,122 (at 3¾ years)	25	22 " 8½ "	Earl Cow ——	25	15 " 0 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Euphorbia 11,229	25	14 lbs. 9¾ oz.
Guinevere Sinclair 11,167	25	14 " 9 "
Lady Clarendon 3d 15,578	25	14 " 5½ "
Sadie's Choice 7979	25	14 " 0 "
Atlanta's Beauty 12,949	12½	21 lbs. 3 oz.
Alberta Signal 18,611	12½	20 " 11 "
Pansy Patterson 18,612	12½	15 " 15 "

Total, 33 *cows.*

SAUGATUCK 1144.

Color, solid. Dropped December 12th, 1873. Bred by W. R. McCready, Connecticut.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Alice Jones 8225	50	31 lbs. 13¾ oz.
Alfleda 6744	25	16 " 4 "
Nannie Fitch 9143	25	14 lbs. 4 oz.
Alfritha 13,673	12½	15 " 3 "

Total, 4 *cows.*

COWS.

LANDSEER'S FANCY 2876.

Color, light fawn and white; eyelids buff; white star; white on shoulders; white forefeet, hind legs and belly. Dropped November 23d, 1873. Bred by W. W. Billings, New London, Connecticut. Sire, Landseer 331. Dam, Young Fancy 97.

This is now, for the amount of butter and richness of milk, the champion cow of the world, she having produced the largest amount of butter for tests of thirty days, sixty days, and a year.

In regard to her official test, Mr. William J. Webster, in a communication to the *Country Gentleman*, says:

"The various tests of this cow are supported by more disinterested proof than any I know of. They have been twice questioned, and each time proved to the satisfaction of the party questioning, who on both occasions became a witness, and made statement giving details of the test.

"She was tested again one day, December 28th, under care of the clerk of our Circuit Court and Mayor of Columbia, and made on this day sixteen pounds ten ounces of milk, and two pounds fifteen ounces of butter. We tested her again from 15th to 21st of May, when her calf was nine months old, and she was due to calve in three months. She gave one hundred and twenty and a quarter pounds of milk, which was churned in four churnings, and yielded seventeen pounds of butter. This was worked, and one ounce of salt added to the pound, and then reworked, and weighed when ready for market.

"After this test was made, knowing that Mr. Samuel N. Warren doubted her

former test, owing to its exceeding great richness, I invited him to come and conduct a test of one day to his satisfaction. He is a breeder well known and of high reputation in this State, and is associated with Major Campbell Brown and Mr. Polk in the ownership of the Clovernook Herd, at Spring Hill, Tenn. She was due to calve in two months after this last test, and her calf was ten months old. She made sixteen pounds three ounces of milk, which churned two pounds eleven and a half ounces of butter, or at the rate of nineteen pounds a week. I regret I did not have her tested officially for a full week at the time, but thought we might be induced to feed her too heavily, and called in Mr. Warren simply to satisfy him as to her yield of one day and the richness of her milk."

The ratio of milk to butter in the official test of Landseer's Fancy was $5\frac{7}{11}$ pounds to one, or $2\frac{5}{8}$ quarts of milk to one pound of butter.

The week's test in May, three months before calving, required $7\frac{1}{14}$ pounds of milk to one pound of butter, and the one-day test, two months before calving, required $5\frac{9}{10}$ pounds of milk, or two and three quarter quarts to make a pound of butter.

Her year's test began January 26th, 1885, when past twelve years old, and was finished January 25th, 1886, making a record of 111 pounds $15\frac{1}{4}$ ounces for thirty days, 206 pounds 9 ounces for sixty days, 302 pounds 15 ounces for ninety days, and for the year 936 pounds $14\frac{3}{4}$ ounces of butter.

TEST FOR ONE YEAR.

"We started her when four months and four days in calf, the test running with the year and not with the calf, to try her powers as a brood cow, as well as capacity as a butter cow.

"She was served by Pogis Chief 3898, on September 22d, 1884, and dropped a bull, Landseer's Pogis, June 29th, 1885, having carried him over five months during the test. She was served by Toltec 6831, September 29th, 1885, and now carries the calf. So she carried the two calves nine months during the test.

"Her usual feed, till May 15th, 1885, was four quarts cornhearts and two quarts bran, over cut hay, twice daily, sometimes more, sometimes less. No accurate account of her feed was kept. On May 15th we began to cut down the feed, and took it entirely from her May 30th, and turned her in the meadow, where she could get plenty of grass and cool out. In doing this many would think I took great risk of milk fever. But I don't believe in starvation at any time. The record needs no explanation. The weights of milk were not kept till July 13th. After July 4th her usual feed was four quarts cornhearts, four quarts oats, and two quarts bran, till October 24th, when it was two quarts cornhearts, two quarts oats, and two quarts bran, twice daily. She is as great a brood cow as she is in the dairy.

Date.	Butter.	
1885.	lbs.	oz.
January 26, 27	6	8
" 28, 29	5	8
" 30, 31	5	4
February 1, 2	5	12
" 3, 4	6	4
" 5, 6	5	
" 7, 8	5	14
" 9, 10	6	4
" 11, 12	7	8
" 13, 14	5	4
" 15, 16	6	4
" 17, 18	5	6
" 19, 20	7	4
" 21, 22	6	6
" 23, 24	7	4
" 25	3	1
" 26, 27	6	4
" 28 and March 1	6	4
March 2, 3	5	9
" 4, 5 (milk partly wasted)	4	10
" 6, 7	6	12
" 8, 9	6	12
" 10, 11	6	1
" 12, 13	6	
" 14, 15	5	9
" 16, 17	5	15
" 18, 19	6	4
" 20, 21	5	
" 22, 23	5	13
" 24, 25	5	12
" 26	3	10
Amount first 60 days	180	14
March 27	3	10
" 28, 29	5	8
" 30, 31	6	12
April 1, 2	6	12
" 3, 4	6	4
" 5, 6	5	9
" 7, 8	6	
" 9, 10	6	1
" 11, 12	7	
" 13, 14	5	9
April *15, 16	5	
" †17, 18	4	11
" 19, 20	4	11
" 21, 22	4	5
" ‡23, 24	5	10
" §25, 26	3	13
" ‖27, 28	4	5
" 29, 30	4	9
May 1, 2	4	5
" ¶3, 4	4	9
" 5, 6	4	2
" **7, 8	5	
" 9, 10	4	10
From March 27 to May 10 inclusive	118	11
First 60 days forward	180	14
Total for 120 days	299	9

This is correct. I superintended this test to this date. L. Taylor, *Manager.*

Date.	Butter.	
1885.	lbs.	oz.
May 11, 12	4	14
" 13, 14	3	10
" 15, 16	3	1
" 17, 18	3	4
" 19, 20	2	8
" 20, 21, 22	3	4
" 24, 25, 26	3	1
" 27, 28, 29, 30	4	11
Total	28	5

"The milk of the 23d was not saved, and from

* Feed reduced on 15th.
† Feed increased on 17th.
‡ Feed reduced on 23d.
§ Feed increased on 25th.
‖ Cut down gradually on 27th and 28th.
¶ Increased on 3d and 4th.
** Cut down on 7th.

the 30th on, although there was one churning of 2.19, it was not counted, because too close to calving to be called gilt-edged butter. We noticed this churning was a little strong, because she was being milked irregularly to reduce flow of milk and quantity of butter.

Date.	Milk. A.M.		Milk. P.M.		Total.		Date Churned.	Butter.	
1885.	lbs.	oz.	lbs.	oz.	lbs.	oz.		lbs.	oz.
July 4							7	3	
" 5, 6							9	5	
" 7							10	2	4
" 8							10	2	12
" 9							12	2	12
" 10							12	2	12
" 11							14	3	11
" 12							14	3	10
" 13	12	12	10	4	23		15	3	1
" 14	11		13		24		16	3	14
" 15	9	8	13		22	8	17	3	7
July 4–16								36	3
July 16	9		12		21		18	5	12
" 17	10	4	10	8	20	12	20	2	9
" 18	10		10	11	20	11	21	4	8
" 19	12		11	6	23	6	22	7	6
" 20	10	11	13	·	23	11		……	
" 21	10	12	10	3	20	15	23	4	9½
" 22	11	2	10	15	22	1	24	4	4
July 16–22					152	8		29	½

"It will be noticed that the milk of the 16th and morning of the 17th—three milkings, 31.4 · was churned together on the 18th, and the night's milking of the 17th was churned on the 20th. This was caused by our moving from one barn to another on the 17th, and the evening's milk placed in a different house.

Date.	Milk. A.M.		Milk. P.M.		Total.		Date Churned.	Butter.	
1885.	lbs.	oz.	lbs.	oz.	lbs	oz.		lbs.	oz.
July 23	11		11	13	22	13	25	3	12
" 24	10	13	10	7	21	4	26	3	13
" 25	11		11	15	22	15	27	3	6
" 26	11		11	9	22	9	28	4	1
" 27	12		11		23		29	3	11
" 28	12	3	11	7	23	10	30	3	8
" 29	11	1	12	3	23	4	31	3	10
July 23–29					159	7		25	13
July 30	11		11	11½	22	11½	1	3	6
" 31	11	12	12	8	24	4	2	3	10
August 1	11	3	11	10	22	13	3	3	8
" 2	12	3	10	4	22	7	4	3	7
" 3	11	8	10		21	8	5	3	7
" 4	12	2	11	3	23	5	6	4	1
" 5	12	7	10	3	22	11	7	3	8
July 30–August 5					159	11½		24	15
August 6	11	7	11	8	22	15	8	3	10
" 7	10	14	10	15	21	13	9	3	15
" 8	10		12		22		10	3	6
" 9	11	7	10		21	7	11	3	9
" 10	11	11	11		22	11	12	3	4
" 11	11	8	10		21	8	13	3	0½
" 12	10	7	10		20	7	14	3	3
August 6–12 inclusive					152	13		23	15½
August 13	11	12	10	3	21	15	15	3	7
" 14	11	8	9		20	3	16	3	6½
" 15	11	11	10		21	11	17	3	
" 16	11	7	9	3	20	10	18	2	6
" 17	12		9		21		19	3	
" 18	11	3	10	3	21	6	20	3	6
" 19	11		9	3	20	3	21	3	2
August 13-19 inclusive					147			21	11½

LANDSEER'S FANCY 2876.

AT 10 YEARS OLD.

Dazzle—Splendid Type.

WEBSTER & MORROW, COLUMBIA, TENNESSEE.

Date.	Milk. A.M. lbs.	oz.	Milk. P.M. lbs.	oz.	Total. lbs.	oz.	Date Churned.	Butter. lbs.	oz.
1885.									
August 20	11	11	8	8	20	3	22	3	1½
" 21	12	2	10		22	2	23	3	6
" 22	12	11	9	15	22	10	24	2	14
" 23	10		7		17		25	3	
" 24	9	3	7	8	16	11	26	3	4
" 25	9	6	8	3	17	9	27	2	15
" 26	10	3	9	6	19	9	28	3	
August 20–26 inclusive					135	12		21	8½
August 27	10	11	8	8	19	3	29	3	4
" 28	13		8	3	21	3	30	3	2
" 29	10	11	8	8	19	3	31	3	1
" 30	8	1	8		16	1	1	3	
" 31	10	3	8		18	3	2	3	4
September 1	10		8		18		3	3	2
" 2	9	3	8		17	3	4	3	7
August 27 – September 3					129			22	4
September 3	11	8	7		18	8	5	3	1
" 4	11	8	7	11	19	3	6	3	10
" 5	9	15	9	12	19	11	7	3	7
" 6	10		7	8	17	8	8	3	4
" 7	11	8	8	11	20	3	9	3	4
" 8	8	9	7	11	16	4	10	3	
" 9	10	14	7	8	18	6	11	3	2
September 3–9 inclusive					129	11		22	12
September 10	10	12	11	8	22	4	12	2	15
" 11	9	13	8		17	13	13	3	3
" 12	10	12	8	12	19	8	14	3	6
" 13	8	13	8	8	17	5	15	3	7½
" 14	10	10	9	4	19	14	16	3	7
" 15	8	5	7	7	15	12	17	2	14
" 16	9	15	7	14	17	13	18	3	2
September 10–16 inclusive					130	5		22	6½

Date.	Milk. A.M. lbs.	oz.	Milk. P.M. lbs.	oz.	Total. lbs.	oz.	Date Churned.	Butter. lbs.	oz.
1885.									
September 17	10	3	7	3	17	6	19	3	
" 18	10	2	9	11	19	13	20	3	7
" 19	10	3	8	7	18	10	21	3	1
" 20	10	7	7	3	17	10	22	3	6
" 21	10	7	9	3	19	3	23	2	12
" 22	7	8	8		15	8	24	3	9
" 23	7	3	6	12	13	15	25	2	7
September 17–23 inclusive					122	1		21	10
September 24	9	3	8	15	18	2	26	2	15
" 25	9		5	12	14	12	27	3	13
" 26	7	8	8		15	8	28	3	5
" 27	10	14	6	3	17	1	29	2	14
" 28	7	12	8		15	12	30	3	3
" 29	8	1	7	9	15	10	1	3	2
" 30	7	14	7	9	15	7	2	2	9
September 24–30 inclusive					112	4		21	13
October 1	8	1	8	3	16	4	3	2	8½
" 2	8	11	6	8	15	3	4	3	6
" 3	8		6	3	14	3	5	3	6
" 4	8	8	7	12	16	4	6	3	
" 5	10	4	7	3	17	7	7	3	8
" 6	9	4	6	9	15	13	8	3	10
" 7	8	8	8	11	17	3	9	4	4
October 1–7 inclusive					112	5		23	10½
October 8	9	11	6	12	16	7	10	3	12
" 9	11	11	8	7	20	2	11	3	13
" 10	9		6	3	15	3	12	4	11
" 11	8	14	7	3	16	1	13	3	11
" 12	9		5	7	14	7	14	2	15
" 13	9	14	7	8	17	6	15	3	
" 14	9	12	7		16	12	16	2	8
October 8–14 inclusive					116	6		24	6

Date.	Milk. A.M.		Milk. P.M.		Total.		Date Churned.	Butter.	
1885.	lbs.	oz.	lbs.	oz.	lbs.	oz.		lbs.	oz.
October 15.....	11	7	8	3	19	10	17	3	10
" 16.....	11	15	6	15	18	14	18	3	8
" 17.....	11	9	9	3	20	12	19	3	13
" 18.....	9	1	9	14	18	15	20	3	3
" 19.....	9	10	9	10	19	4	21	3	8
" 20.....	9	10	6	15	16	9	22	3	5
" 21.....	10	3	5	3	15	6	23	2	9
October 15-21 inclusive.....	.....		.....		129	6		23	8
October 22.....	12	2	4	14	17		24	2	12
" 23.....	6	8	4	7	10	5	25	2	2
" 24.....	7	11	4	7	12	2	26	1	12
" 25.....	7	4	5	1	12	5	27	2	1
" 26.....	7	11	5	11	13	6	28	2	14
" 27.....	7	11	5	11	13	6	29	2	2
October 22-27 inclusive.....	.....		.....		79	2		13	11
October 28.....	8	3	6	3	14	6	31	5	4
" 29.....	10	0	6	6	16	6			
" 30.....	8	13	6	6	15	3	2	4	14
" 31.....	7	2	4	13	11	15			
November 1.....	8	4	5	0	13	4	3	3	2
" 2.....	8	0	5	9	13	9	4	3	3
" 3.....	7	2	6	3	13	5	5	3	2
" 4.....	8	6	6	7	14	13	6	3	1
" 5.....	9	3	6	2	15	5	7	3	0
" 6.....	8	14	5	0	13	14	8	3	1
October 28 – November 6.....	.....		.....		142			28	11
November 7.....	9	6	5	15	15	5	9	2	12
" 8.....	8	2	6		14	2	10	3	0
" 9.....	9	6	5		14	6	11	2	14
" 10.....	8	2	8	2	16	4	12	3	4
" 11.....	8	10	5	7	14	1	13	3	
" 12.....	8	9	6		14	9	14	3	
" 13.....	9	10	7	2	16	12	15	2	10
November 7-13..	.....		.....		105	7		20	8
November 14.....	8		6	10	14	10	16	3	
" 15.....	8	3	6	3	14	6	17	3	3
" 16.....	8	9	6	3	14	12	18	3	
" 17.....	8	14	6	2	15		19	3	2
" 18.....	9	1	5	6	14	7	20	2	15
" 19.....	8	8	5	6	13	14	21	2	13
" 20.....	8	8	7	3	15	11	22	2	11
November 14–20..	.....		.....		102	12		20	12
November 21.....	9	5	6	12	16	1	23	2	12
" 22....	9		7	2	16	2	24	2	13
" 23....	10	6	5	2	15	8	25	2	14
" 24.....	10	5	6	2	16	7	26	3	3
" 25.....	11	3	7	7	18	10	27	3	12
" 26.....	11	10	6	15	18	9	28	2	8
" 27.....	10	7	5	4	15	11	29	3	3
November 21-27..	.....		.....		117			21	2
November 28.....	9	7	6	3	15	10	30	2	12
" 29.....	10	8	5	2	15	10	1	3	1
" 30.....	10		5	14	15	14	2	2	13
December 1.....	9	5	5	7	14	12	3	3	1
" 2.....	6	7	5	10	12	1	4	4	1
" 3.....	6	12	5	10	12	6	5	2	7
" 4.....	5	10	3	10	9	4	6	1	14
Nov. 28– Dec. 4..	.....		.....		95	9		20	1
December 5.....	4	12	4		8	12			
" 6.....	5	5	2	14	8	3	7	4	7
" 7.....	5		3	3	8	3			
" 8.....	5	10	3	2	8	12	9	2	13
" 9.....	6	4	3	13	10	1			
" 10.....	6		3	1	9	1	12	3	
" 11.....	6	3	3	13	10				
" 12.....	6	13	4	8	10	5	14	5	2
" 13.....	6	10	4	8	11	2			
" 14.....	7	10	4	7	12	1	16	4	1
" 15.....	7	12	4	2	11	14			
" 16.....	7	14	5	3	13	1	18	4	2
" 17.....	7	14	5	11	13	9			
" 18.....	7	4	5	7	12	11	20	4	3
Dec. 5–18 inclusive	.....		.....		147	11		27	12

Date.	Milk. A.M. lbs.	Milk. A.M. oz.	Milk. P.M. lbs.	Milk. P.M. oz.	Total. lbs.	Total. oz.	Date Churned.	Butter. lbs.	Butter. oz.
1885.									
December 19.....	6	14	4	11	11	9	21	2	12
" 20.....	6	15	4	11	11	10	22	2	6
" 21.....	7	6	4	4	11	10			
" 22.....	7	8	4	11	12	3	24	4	14
" 23.....	8	12	6	15	15	11			
" 24.....	7	0	5	8	12	8	26	4	13
" 25.....	7	0	5	2	12	2			
" 26.....	7	6	5	0	12	6	28	5	1
" 27.....	8	1	5	2	13	3			
" 28.....	8	8	5	2	13	10	30	4	4
" 29.....	7	2	5	6	12	8			
" 30.....	7	9	4	10	12	3	1	4	5
" 31.....	7	2	5	10	12	12	3	3	1
December 19–31 inclusive.......	.....		......		163	15		31	8
1886.									
January 1.....	7	4	5	2	12	6	3	3	1
" 2.....	7	10	4	10	12	4			
" 3.....	7	2	5	2	12	4	5	4	1
" 4.....	7	6	4	14	12	4			
" 5.....	6	14	4	14	11	12	7	4	7
" 6.....	7	2	4	14	12	0			
" 7.....	7	10	5	6	13	0	9	4	11
January 1–7 inclusive.........	.....		......		85	14		16	4
1886.									
January 8.....	7	0	5	2	12	2			
" 9.....	7	14	4	4	12	2			
" 10.....	6	14	5	2	12	0	12	8	10
" 11.....	6	13	3	10	10	7			
" 12.....	8	0	5	5	13	5	14	4	8
" 13.....	6	14	3	12	10	10			
" 14.....	7	8	4	9	12	1	16	5	1
January 8–14 inclusive.	.....		.....		82	7		18	3
January 15.....	7	13	4	11	12	8			
" 16.....	7	4	4	6	11	10	18	4	13
" 17.....	7	7	4	2	11	9			
" 18.....	7	9	4	0	11	9	20	4	11
" 19.....	6	14	4	13	11	11			
" 20.....	6	14	4	12	11	10	22	4	11
" 21.....	4	11*	4	11	9	6			
" 22.....	6	3	4	4	10	7	24	4	11
" 23.....	5	10½	3	10	9	4½	25	2	10¾
" 24.....	4	4	3	2	7	6			
" 25.....	4	1	3	10	7	11	27	3	7
January 15–25 inclusive.........	.....		.....		114	11½		24	15¾

The foregoing record of Landseer's Fancy 2876, from July 4th, 1885, to January 25th, 1886, evenings inclusive, is correct.

RECAPITULATION.

	lbs.	oz.
From January 26th, 1885, to March 26th, 1885, inclusive.............	180	14
From March 17th, 1885, to May 10th, 1885, inclusive................	118	11
Total..	299	9

This as per statement of L. Taylor, manager.

* Part spilled.

	lbs.	oz.
Carried forward	299	9
From May 11th, 1885, to May 30th, 1885, inclusive	28	5
This as per statement of W. J. Webster.		
Amount before dropping calf	327	14
From July 4th to 15th, inclusive	36	3
From July 16th to 22d, inclusive	29	½
From July 23d to 29th, inclusive	25	13
From July 30th to August 5th, inclusive	24	15
From August 6th to 12th, inclusive	23	15½
From August 13th to 19th, inclusive	21	11½
From August 20th to 26th, inclusive	21	8½
From August 27th to September 2d, inclusive	22	4
From September 3d to 9th, inclusive	22	12
From September 10th to 16th, inclusive	22	6½
From September 17th to 23d, inclusive	21	10
From September 24th to 30th, inclusive	21	13
From October 1st to 7th, inclusive	23	10½
From October 8th to 14th, inclusive	24	6
From October 15th to 21st, inclusive	23	8
From October 22d to 27th, inclusive	13	11
From October 28th to November 6th, inclusive	28	11
From November 7th to 13th, inclusive	20	8
From November 14th to 20th, inclusive	20	12
From November 21st to 27th, inclusive	21	2
From November 28th to December 4th, inclusive	20	1
From December 5th to 18th, inclusive	27	12
From December 19th to 31st, inclusive	31	8
From January 1st, 1886, to January 7th, inclusive	16	4
From January 8th to 14th, inclusive	18	3
From January 15th to 25th, inclusive	24	15¾
Amount of butter from January 26th, 1885, to evening of January 25th, 1886—one year	936	14¾

"During this year she was out of the dairy from May 30th, 1885, to June 29th, date of calving, and till July 4th after calving, the first day's milk being July 4th, after dropping bull, Landseer's Pogis."

On the three hundred and sixty-third day of her year, and the three hundred and thirty-eighth of her test, four and a half months in calf, she made 2 pounds 10¾ ounces of butter from 9 pounds 4½ ounces of milk, *a pound of butter from* $3\frac{47}{100}$ *pounds or three pints of milk.*

The test for richness of milk was a public one, conducted by the Tennessee Breeders' Association.

Mr. Webster says: "A great many think that there must be some unusual treatment to produce such results. It is much more simple than they suppose.

"There have several serious mistakes been made during the year, and if she had not been a cow of great recuperative power, she would have broken down. The record shows that our most successful treatment was when she was under good, high feed, but not the highest. I am satisfied that there is more in constant care and watchfulness than in forcing, and the feed should be for butter only.

"A cow is not made rich in a week or month, and possibly not the richest even in a year."

LANDSEER'S FANCY AND TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
LANDSEER'S FANCY 2876	100	29 lbs. 8 oz. / 21 " 15 "	Toltec's Fancy 27,172	50	17 lbs. 6 oz.
Rosy Dream 9808	50	19 " 1 "	Maquilla 24,043	25	20 " 1 "
			Total, 4 cows.		

1874.

BULLS.

SANS PEUR, F. 201 J. H. B.—H. C.

Color, gray; right foreleg and lower part of arm white; white line on right stifle. Dropped April, 1874. Sire, Welcome, F. 166 J. H. B.—H. C. Dam, Fanchon, F. 1432 J. H. B.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Fear Not 6059	50	17 lbs. 10 oz.	Fan's Grouville Beauty 10,079	25	19 lbs. 3 oz.
Buttercup 17,825	50	16 " 8 "	Lucilla Kent 8892	25	15 " 10 "
Fan of Grouville 7458	50	15 " 0 "	*Total, 6 cows.*		
Fear Not 2d 6061	25	16 " 2 "			

DEERFOOT BOY 1926.

Color, solid gray; black points. Dropped July 19th, 1874. Bred by E. Burnett. Sire, Albion 490. Dam, Daisy of Deerfoot 3182.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Abbie Z. 3d 14,742	50	17 lbs. 0 oz.	Dena of Deerfoot 15,325	50	14 lbs. 8 oz.
Polly of Deerfoot 15,328	50	15 " 0 "	Cressy of Deerfoot 15,324	50	14 " 0 "

Total, 4 cows.

CLAIMANT, P. 84 J. H. B.—C.

Color, solid fawn ; black points. Dropped 1874.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Nancy Lee 7618	.50	26 lbs. 8½ oz.
Royal Beauty 18,908	.25	15 " 2½ "
Bohemian Gipsy 17,452	.25	14 " 11 "
Lizzie C. 7713	.25	14 " 0 "
Lalla Rookh of Sugar Grove 15,882	12½	20 lbs. 1 oz.
Variella of Linwood 10,954	12½	14 " 1 "
Total, 6 cows.		

COLUMBIAD 2d 1515.

Solid color ; black points. Dropped April 11th, 1874. Bred by C. and D. Pennington, Paterson, N. J. Sire, Columbiad 534. Dam, Celestia 1898.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Aspirante 9272	.75	14 lbs. 7 oz.
PET OF ROSE LAWN 11,326	.50	18 " 2½ " 15 " 8½ "
Alluring 5541	.50	19 lbs. 5 oz.
Rose of Rose Lawn 9365	.50	16 " 3 "
Total, 4 cows.		

HERO, P. 90 J. H. B.—H. C.

Color, solid dark red ; eyes encircled with orange. Dropped 1874.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Daisy of St. Peters 18,175	.50	20 lbs. 5½ oz.
Satin Bird 16,380	.50	14 " 15½ "
Jenny Le Brocq 9757	.50	14 " 14 "
COCOTTE 11,958	.50	14 " 12 " 14 " 6 "
Westphalia 24,384	.25	24 " 9½ "
Mousy 2d 14,962	.25	17 lbs. 1 oz.
Bergerelia 15,546	.25	14 " 1½ "
Cetewayo's Silver Bell 18,952	12½	17 " 2½ "
Cetewayo's Dorcas 20,287	12½	16 " 2½ "
Total, 9 cows.		

CECCO 1673.

Color, solid dark fawn ; black points. Dropped October 15th, 1874. Bred by Robert Hoe, Tarrytown, N. Y. Sire, Mercury 432. Dam, Ceres 427.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Ceccola 13,608	.50	16 lbs. 13 oz.
Idaletta 11,843	.50	15 " 14½ "
Idalene 11,841	.50	15 " 8½ "
Ideal 11,842	.50	14 lbs. 12½ oz.
Ideal Alphea 18,755	.25	14 " 6 "
Total, 5 cows.		

PIERROT 7th 1667.

Color, dark gray; black switch; black tongue. Dropped December 1st, 1874. Bred by S. C. Colt, Hartford, Conn. Sire, Pierrot 636. Dam, Pet 811.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Palestine Pierrot 24,099	. 75	14 lbs. 6 oz.	Palestine's Last Daughter 12,602	. 50	14 lbs. 6 oz.
Pierrot's Lady Bacon 12,482	50	16 " 10 "	Pierrot's Countess 12,480	. 50	14 " 0 "
Pierrot's Picture 12,481	. 50	16 " 0 "	Countess of Lorne 20,822	. 25	14 " 14 "
Lady Hayes 10,136 . .	. 50	16 " 0 "	Madame Argyle 19,476 .	. 25	14 " 1 "
Pierrot's Lady Hayes 11,672	50	15 " 12 "	*Total,* 10 *cows.*		
Lady Fanning 11,169 .	. 50	14 " 6 "			

RECTOR 1458.

Color, solid. Dropped April 9th, 1874. Bred by Campbell Brown, Spring Hill, Tenn. Sire, Pertinatti. Dam, Roxana 2d 2532.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Bonnie Yost 7943 . .	. 50	18 lbs. 2 oz.	Lucetta 6856	. 50	14 lbs. 3 oz.
Leoni 11,868	. 50	18 " 2 "	Dora Doon 12,909 . .	. 25	15 " 0 "
Dudu of Linwood 8336	. 50	16 " 15 "	*Total,* 5 *cows.*		

HURRAH 2814.

Solid fawn; black points. Bred by S. R. Gridley, Bristol, Conn. Dropped March 11th, 1874. An inbred Tom Dasher 420 and Paterson 11. Sire, Colonel Crockett 1694. Dam Village Girl 5744.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
VALUE 2d 6844 . . .	. 50	**25** lbs. **2**$\frac{11}{12}$ oz.	Hurrah Pansy 12,153 .	. 50	14 lbs. 1½ oz.

Total, 2 *cows.*

JERSEY BOY, P. 92 J. H. B.—H. C.

Color, solid dark gray. Dropped 1874.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Oakland's Cora 18,853 .	. 50	19 lbs. 9½ oz.	Elsie Lane 13,302 . .	. 12½	15 lbs. 4 oz.
Scipio's Lively 19,869 .	. 25	14 " 7 "	Betsona 16,776 . . .	. 12½	14 " 3 "
Queen Neptune 15,501 .	. 12½	18 " 13½ "			
Rosona 12,956	. 12½	16 " 7 "	*Total,* 6 *cows.*		

LORD LAWRENCE 1414.

Color, dark French gray; black tongue and switch. Bred by T. J. Hand, New York. Dropped May 11th, 1874.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Lady of Bellevue 7705	50	15 lbs. 11 oz.
Countess Gasela 9571	50	15 " 11 "
Witch Hazel 4th 6131	50	15 " 5½ "
Fall Leaf 8587	50	14 " 8 "
Lorella 12,913	50	14 " 7 "
The Widow's Daughter 11,507	25	19 lbs. 8½ oz.
Fanny Bugler 19,962	25	15 " 2 "
Rosy Dream 9808	25	14 " 13 "
Total, 8 cows.		

LORD BRONX 2d 1730.

Solid color; black points. Bred by H. E. Johns, Bloomfield, Conn. Dropped June 10th, 1874.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Hazen's Bess 7329	50	24 lbs. 11 oz.
Arnold's Lulu 7328	50	15 " 0 "
Herberta 8811	50	16 lbs. 15 oz.
Total, 3 cows.		

OXOLI 1922.

Color, fawn; shaded with dun. Sire, grandsire and great-grandsire, eighty seven and a half per cent. St. Helier 45. Bred by Dr. O. S. Hubbell, Stratford, Conn. Dropped March 30th, 1874.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Volie 19,465	50	18 lbs. 1 oz.
Kaoli 18,980	50	17 " 8 "
Zithey 9184	50	16 " 7 "
Lesbie 9179	50	16 " 8 "
Maculae 24,277	50	15 " 3 "
Renini 9181	50	14 " 10½ "
Bintana 9837	50	14 lbs. 8½ oz.
Taglioni 9182	50	14 " 1 "
Trenie 17,770	37½	14 " 10 "
Queen of Chenango 17,771	25	14 " 6 "
Flamant 11,270	25	14 " 2 "
Total, 11 cows.		

PRINCE OF WARREN 1512.

Solid color; black points. Bred by J. H. McHenry, Baltimore, Md. Dropped July 17th, 1874. Sire, Southampton 117. Dam, Golddrop 222. For Prince of Warren type see portrait of Lady Madeline 10,526 in frontispiece.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Lady Conover 2d 17,589	.75	20	lbs.	0	oz.
Tamy Lowndes 25,316	.75	16	"	2	"
Dot of Bear Lake 6170	.50	19	"	3	"
Conover's Beauty 12,650	.50	18	"	4	"
Lady Warren 12,168	.50	16	"	7	"
Tamy 3d 6127	.50	16	"	0	"
Ida of Bear Lake 6169	.50	16	"	0	"
Mary of Bear Lake 6171	.50	15	lbs.	14	oz.
Gledelia 10,524	.50	15	"	0	"
Lena Lowndes 23,202	.50	14	"	7	"
Countess Lowndes 26,874	.25	17	"	8	"
Witch Hazel 4th 6131	.25	15	"	5½	"
Mary's Silver Drop 14,325	25	15	"	4½	"
Total, 13 cows.					

REX 1330.

Color, solid orange gray fawn, with dark shadings around eyes; black switch and tongue. Bred by John O. Couch, Middlefield, Conn. Dropped April 17th, 1874. Sire, Colt Jr. 825. Dam, Couch's Lily 3237.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.			
Hepsy 2d 12,008	.50	17	lbs.	8	oz.
Arawana Queen 5368	.50	16	"	9	"
Princess Bellworth 6801	.50	15	"	10½	"
Usilda 2d 6157	.50	15	"	2½	"
Favorite Rajah Rex 16,153	50	15	"	0	"
Louvie 3d 6159	.50	14	"	13	"
Bell Rex 11,700	.50	14	"	10	"
Princess Rose 6249	.50	14	"	8	"
Jeannie Platt 6005	.50	14	"	4	"
Lottie Rex 18,757	.50	14	"	4	"
Pet Rex 20,166	.50	14	"	4	"
Kerni Rex 13,671	.50	14	"	0	"
Rosy Kate's Rex 13,192	.25	18	"	3	"
Maggie Rex 28,623	.25	17	lbs.	0½	oz.
Sister Rex 13,194	.25	16	"	8	"
Elsie Lane 13,302	.25	15	"	4	"
Chautauqua Queen 26,403	25	14	"	11	"
Sister Cash 33,987	.25	14	"	10	"
Lilley Rex 9852	.25	14	"	7	"
Lady Panalphrex 17,400	.12½	23	"	9	"
CARRIE LENA 3d 20,077	.12½	**16**	"	**5**	"
Guinevere Sinclair 11,167	.12½	16	"	2	"
Lass Rex Alphea 16,965	.12½	16	"	10¾	"
Ethalka 2d 14,128	.12½	15	"	0	"
Total, 24 cows.					

SWEEPSTAKES DUKE 1905 (*P. 76 J. H. B.—H. C.*)

Color, solid gray. Bred on Island of Jersey. Won Sweepstakes Prize with complete score, of Island Scale of Points, at one year old, show of 1875. Dropped April, 1874. Imported by Moses Ellis, Massachusetts, October, 1875.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Fairy Queen of St. Belades 7464	50	19 lbs. 7½ oz.	**MAMELLE** 20,804	12½	**21** lbs. **8¼** oz.
Valentine of Trinity 7469	50	19 " 4 "	Rozel Lass 20,268	12½	19 " 9½ "
Queen of Nubbin Ridge 14,528	50	17 " 8 "	St. Jeannaise 15,789	12½	16 " 4 "
Forget-Me-Not 5809	50	15 " 8 "	Maritana 12,039	12½	16 " 3½ "
Deerfoot Girl 15,329	50	15 " 0 "	Fear Not 2d 6061	12½	16 " 2 "
Florence Billot 7849	50	14 " 13 "	Geneva 13,220	12½	15 " 11 "
Energy 22,016	50	14 " 5 "	Farmer's Floss 17,773	12½	15 " 11 "
Lily of the Valley 7439	50	14 " 0 "	Happy Blossom 18,218	12½	15 " 8 "
Handsome Myra 14,244	25	20 " 8 "	Marie S. 12,043	12½	15 " 6 "
Camelia 2d 11,188	25	20 " 3 "	Kate Pansy 15,177	12½	15 " 1 "
Lady Velvetine 15,771	25	17 " 2 "	Sweet Sixteen 10,682	12½	14 " 15 "
Les Cateaux 2d 15,538	25	16 " 1 "	Regina's Guide 16,862	12½	14 " 12 "
Cassis 12,028	25	16 " 0 "	Peggy Ford 21,713	12½	14 " 10 "
Olymph 17,957	25	15 " 13 "	L'Etoile du Nord 16,419	12½	14 " 9 "
Lady Kingscote 26,085	25	15 " 10 "	Tale-Bearer 24,535	12½	14 " 8 "
La Financiere 11,970	25	15 " 5½ "	Lady Young 16,668	12½	14 " 0 "
Lydia of Libby 11,698	25	15 " 3 "	Well Done 25,987	6¼	19 " 4 "
Forsaken 7520	25	15 " 1 "	Signaldella 24,107	6¼	18 " 1¾ "
Lady Jane of St. Peters 7475	25	15 " 0 "	Glory of Elmarch 21,521	6¼	15 " 13½ "
Sweetrock 18,256	25	14 " 11½ "	Cicero's Mabel 18,238	6¼	15 " 2 "
Lady Vertumnus 13,217	25	14 " 10 "	Les Marais Dell 20,314	6¼	15 " 8 "
Jazel's Maid 11,011	25	14 " 6 "	Baron's Rosette 25,988	6¼	15 " 4 "
La Rouge 12,405	25	14 " 2 "	Lady Fair 22,103	6¼	14 " 12 "
Beulah de Gruchy 13,480	12½	22 " 2 "	Pendule 2d 16,709	6¼	14 " 6 "
			Nervine 25,932	6¼	14 " 1½ "
			Total, 49 *cows*.		

TOP SAWYER 1404.

Color, solid squirrel gray; black points. Dropped May 19th, 1874. Bred by T. J. Hand, New York. Sire, Marius 760. Dam, Emblem 90.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Cora of Linwood 12,915	50	22 lbs. 0 oz.	Busy Bee 7590	50	16 lbs. 4 oz.
Vixen 7591	50	17 " 6 "	Fleurette of Linwood 12,918	50	16 " 0 "
Beeswax 9807	50	17 " 5 "	Dora Doon 12,909	50	15 " 0 "

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days
Opaline 7590	.50	14 lbs. 10 oz.	Ethleel 18,724	.25	19 lbs. 14 oz.
Denise 8281	.50	14 " 4½ "	Cherokee Rose 20,921 . .	.25	23 " 10 "
Litza 6338	.50	14 " 3 "	Romping Lass 11,021 . .	.25	15 " 0 "
Fandango 12,908	.50	14 " 3 "	Jaquenetta 10,958 . . .	.25	14 " 6 "
Romp Ogden 3d 5458 . .	.50	14 " 1 "	Variella of Linwood 10,954	25	14 " 1 "
ETHLEEL 2d 32,291	.37½	**30 " 15** "			
Maquilla 24,043	.25	20 " 1 "	*Total,* 18 *cows.*		

CLIVE DUKE 1901.

Color, solid. Dropped June 19th, 1874. Bred by T. S. Kennedy, Louisville, Ky. Sire, Prize Duke 942. Dam, Welcome Beauty 1268.

TESTED DESCENDANTS.

Name.	Blood, Per Cent	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Oitz 8649	.50	15 lbs. 15 oz.	Halsie McCurdy 12,379	.50	14 lbs. 3½ oz.
Peggotty H. 8639 . . .	.50	15 " 6 "	*Total,* 3 *cows.*		

COWS.

AZELDA 3872.

Solid color; black points. Sire, Grand Duke Alexis 1040. Dam, Grand Duchess of St. Peters 2733. Bred by J. A. Hayt, Patterson, N. Y. Dropped March 13th, 1874.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Gold Trinket 9518 . . .	.50	17 lbs. 2 oz.	Pansy Patterson	.25	15 lbs. 15 oz.
Valhalla 5300	.50	17 " 0 "	Guinevere Sinclair 11,167 .	25	14 " 9 "
Belle of Patterson 5664 .	.50	16 " 6 "	Alberta Signal	.12½	20 " 11 "
Azelda 2d 7022	.50	15 " 2 "	*Total,* 7 *cows.*		

1875.

BULLS.

DUKE OF DARLINGTON 2460.

Color, solid gray; black points. Sire, Sarpedon 930. Dam, Eurotas 2454. Bred by A. B. Darling, Ramseys, N. J. Dropped April 1st, 1875.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Mother Hubbard 10,331	.50	24 lbs. 1½ oz.	Nazli 10,327	.50	15 lbs. 3½ oz.
BOMBA 10,330	.50	**21 " 11½** "	Eupidee's Perfection 20,175	25	15 " 4 "
Matilda 5th 18,068 . . .	.50	16 " 4 "	Dove Dee 18,059	.25	15 " 3 "
Leah Darlington 13,836	.50	15 " 5½ "	*Total,* 7 *cows.*		

KHEDIVE, P. 103 J. H. B.—H. C.

Color, solid light fawn. Dropped 1875. Sire, Leo F. 198—H. C. Dam, Coomassie 11,874.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
PRINCESS 2d 8046	50	46 lbs. 12½ oz.
Ona 7840	50	22 " 10½ "
LE BROCQ'S CURFEW 30,967	50	18 " 0 " / *15 " 12½* "
Daisy Queen 9619	50	16 " 4 "
Desire 24,360	50	16 " 3 "
Blonde 2d 9268	50	14 " 4 "
St. Jeannaise 15,789	37½	16 " 4 "
OXFORD KATE 13,646	25	39 " 12 "
Westphalia 24,384	25	24 " 9½ "
Little Torment 15,581	25	23 " 2½ "
Pilot's Veronica 18,917	25	20 " 2 "
Ethleel 18,724	25	19 " 14 "
Arthur's Mistletoe 11,968	25	17 " 11½ "
Daisy Brown 12,213	25	17 " 6½ "
Princess of Ashantee 13,467	25	16 " 12 "
Miss Porter 20,300	25	16 " 6 "
Ruby Wray ——	25	16 " 0 "
Rose of Oxford 13,469	25	15 " 14½ "
Romping Lass 11,021	25	15 lbs. 0 oz.
Nell Gwynn 9654	25	14 " 0 "
Ada Minka 15,562	25	14 " 0 "
ETHLEEL 2d 32,291	12½	**30 " 15** "
Fillpail 2d 24,388	12½	25 " 2 "
Maquilla 24,043	12½	20 " 1 "
KHELULA 17,970	12½	19 " 8 " / **14 " 6½** "
King's Trust 18,946	12½	18 " 0 "
Toltec's Fancy 27,172	12½	17 " 6 "
Rosona 12,956	12½	16 " 7 "
Granny's Gem 30,406	12½	16 " 5¼ "
Bessie R. 13,503	12½	16 " 0 "
Elsie Lane 13,302	12½	15 " 4 "
Prize Rose 16,309	12½	15 " 1 "
Deletta 21,305	12½	14 " 15½ "
Betsona 16,776	12½	14 " 3 "

Total, 34 cows.

SILVER MINE 1658.

Color, solid fawn; black tongue. Dropped January 28th, 1875. Bred by Dr. A. D. Newell, New Jersey. Sire, Silverlocks Jr. 699. Dam, Minerva 1529.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Nancy Lovelock 15,511	75	17 lbs. 9 oz.
Siloam 17,623	50	18 " 10 "
Countess Coomassie 19,339	50	16 " 10 "
Queen of Nubbin Ridge 14,528	25	17 lbs. 0 oz.

Total, 4 cows.

BARONET 2240.

Color, dark gray. Dropped April 12th, 1875. Bred by R. H. Stephens, Montreal, Canada. Sire, Lord Lisgar 1066. Dam, Amelia 484.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Baronetti 8425	50	16 lbs. 14 oz.
Chamomilla 7552	50	16 " 10 "
Bonnie 2d 5742	50	14 " 11½ "
Uinta 5743	50	14 lbs. 10 oz
Bonnie Fawn 6190	50	14 " 0 "

Total, 5 cows.

GUY FAWKES, F. 251 J. H. B.—H. C.

Color, solid light gray, except white spot on forehead; black points. Dropped December, 1875. Bred by Philip Godeaux, Trinity, Jersey. Sire, Koffee, F. 233 J. H. B. Dam, Angelica, F. 1738 J. H. B.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Island Star 11,876	50	21 lbs. 3 oz.
Thaley 14,299	50	16 " 0 "
Queen of Ashantee 14,554	50	15 " 2 "
Auntybel 15,582	50	14 " 9 "
Moggie Bright 25,891	25	16 " 6 "
Young Garenne 3d 13,648	25	16 lbs. 3 oz.
Liberty 2d 16,717	25	14 " 6½ "
Pendule 2d 16,709	25	14 " 6 "

Total, 8 cows.

STOKE POGIS 3d 2238.

Color, mulberry fawn; black switch. Bred by Peter Leclair, Winooski, Vt. Dropped March 29th, 1875.

Just previous to the announcement of the test of Mary Anne of St. Lambert 9770 the owner of Stoke Pogis 3d 2238, living near Montreal, killed him "because he made such a nice lot of beef;" he "dressed seventeen hundred pounds."

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
MARY ANNE OF ST. LAMBERT 9770	50	**36** lbs. **12¼** oz.
IDA OF ST. LAMBERT 24,990	50	**30** " **2½** "
MERMAID OF ST. LAMBERT 9771	50	**25** " **13½** "
NAIAD OF ST. LAMBERT 12,965	50	**22** " **2½** "
Nora of St. Lambert 12,962	50	22 " 0 "
NIOBE OF ST. LAMBERT 12,969	50	**21** " **4½** "
Brenda of Elmhurst 10,762	50	20 " 8 "
Honeymoon of St. Lambert 11,221	50	20 " 5¼ "
RIOTER PINK OF BERLIN 23,665	50	**19** " **14** "
Cowslip of St. Lambert 8349	50	17 " 12 "
Minnette of St. Lambert 9774	50	17 " 4 "
Crocus of St. Lambert 8351	50	17 lbs. 12 oz.
Diana of St. Lambert 6636	50	16 " 8 "
Maggie of St. Lambert 9776	50	16 " 3 "
Moth of St. Lambert 9775	50	16 " 2 "
Rioter's Nora 21,778	50	15 " 9 "
La Belle Petite 5472	50	15 " 8 "
Mavourneen of St. Lambert 9777	50	15 " 7 "
May Day Stoke Pogis 28,333	50	15 " 3 "
Cupid of Lee Farm 5997	50	14 " 6 "
Nancy of St. Lambert 12,964	50	14 " 5 "
Rioter's Beauty 14,894	37½	14 " 0 "
Rose of St. Lambert 20,426	25	21 " 3½ "
Rioter's Maggie 22,530	25	18 " 6½ "
Carrie Pogis 22,568	25	15 " 9 "
Maggie Sheldon 23,583	25	15 " 3 "
Mintha 12,812	25	15 " 0 "

Total, 27 cows.

SUPERB 1956.

Nearly solid color. Sire, Pierrot 2d 1669. Dam, Myrtle 2d 211. Bred by Thomas Fitch, New London, Conn. Dropped June 16th, 1875.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Belmeda 6229	.50	18 lbs. 12 oz.	Lida Mullin 9198	.50	16 lbs. 8 oz.
Floret 9959	.50	17 " 6 "	Lizzie D. 10,408	.50	14 " 0 "

Total, 4 cows.

COWS.

MOSTAR 6971.

Color, fawn, with gray shadings, a little white. Bred by James Young, Jr., Pennsylvania. Dropped April 27th, 1875.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Princess Mostar 9700	.50	17 lbs. 3 oz.	El Mora Mostar 15,955	.50	14 lbs. 0 oz.
Lillian Mostar 10,364	.50	14 " 3 "	*Total, 3 cows.*		

1876.

NIOBE DUKE 2364.

Solid color; black points. Sire, Jeweler 1385. Dam, Niobe 6th 3516. Bred by J. S. Jenkins. Dropped April 24th, 1876.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Thorndale Belle 3d 10,459	.50	15 lbs. 15 oz.	Alfritha 13,673	.25	15 lbs. 3 oz.
Mitten 13,368	.50	15 " 11 "	Peggy Ford 21,713	.25	14 " 10 "
Belle Thorne 13,369	.50	14 " 11 "	*Total, 5 cows.*		

CASH BOY 2248.

Color, nearly solid; a faint white spot on right side; dark switch. Dropped January 14th, 1876. Bred by Lyman A. Mills. Sire, Rex 1330. Dam, Dido of Middlefield 3416.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Rosy Kate's Rex 13,192	.50	18 lbs. 8 oz.	Sister Cash 33,987 . . .	.50	14 lbs. 10 oz.
Maggie Rex 28,623 . . .	.50	17 " 0½ "	**CARRIE LENA 3d** 20,077	25	**16** " **5** "
Sister Rex 13,194 . . .	.50	16 " 8 "			

Total, 5 cows.

GREY KING, P. 169 J. H. B.—H. C.

Dropped 1876.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Camelia 2d 11,188 . . .	.50	20 lbs. 3 oz.	Marie S. 12,043	.25	15 lbs. 6 oz.
Cassis 12,028	.50	16 " 0 "	Beauty of the Grange 7502	12½	23 " 9 "
La Financiere 11,970 . .	.50	15 " 5¼ "	Well Done 25,987 . . .	.12½	19 " 4 "
Lady Jane of St. Peters 7475	.50	15 " 0 "	Eveline of Jersey 6781 . .	12½	18 " 6 "
Beulah de Gruchy 13,480	.25	22 " 2 "	Glory of Elmarch 21,521 .	12½	15 " 13¼ "
Rozel Lass 20,268 . . .	.25	19 " 9½ "	Baron's Rosette 25,988 . .	12½	15 " 4 "
Maritana 12,039	.25	16 " 3½ "	Queen of Ashantee 2d 16,659	12½	14 " 3½ "
Geneva 13,220	.25	15 " 11 "	Nervine 25,932	.12½	14 " 1½ "
Farmer's Floss 17,773 . .	.25	15 " 11 "			

Total, 17 cows.

VERTUMNUS, P. 161 J. H. B.—H. C.

Color, brown; white patch in forehead. Dropped February, 1876. Bred by Philip Godeaux, Trinity, Jersey. Sire, *Sweepstakes Duke* 1595 (P. 76 J. H. B.—H. C.) Dam, *Coomassie* 11,874—the two most noted prize-winners of Jersey.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Olymph 17,957	.50	17 lbs. 3 oz.	St. Jeannaise 15,789 . .	.25	16 lbs. 4 oz.
Lady Velvetine 15,771 .	.50	17 " 2 "	Fear Not 2d 6061 . . .	.25	16 " 2 "
Les Cateaux 2d 15,538 .	.50	17 " 2 "	Happy Blossom 18,218 .	.25	15 " 8 "
Lady Kingscote 26,085 .	.50	15 " 10 "	Les Marais Dell 20,314 .	.12½	15 " 8 "
Lady Vertumnus 13,217	.50	14 " 10 "	Cicero's Mabel 18,238 .	.12½	15 " 2 "
La Rouge 12,405	.50	14 " 2 "	Pendule 2d 16,709 . . .	.12½	14 " 6 "
Lady Young 16,668 . . .	.50	14 " 0 "			

Total, 13 cows.

BROWNY, P. 158 J. H. B.—H. C.

Color, light brown; black switch; tongue black and white. Dropped March, 1876. Sire, Tom 77 J. H. B. Dam, Fairy 964 J. H. B.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Miss Browny 7288	50	16 lbs. 13 oz.	Cherokee Rose 20,921	25	23 lbs. 10 oz.
Royal Beauty 18,908	50	15 " 2½ "	Granny's Gem 30,406	25	16 " 5¼ "
Beauty 7414	50	15 " 0 "	Variella of Linwood 10,954	25	14 " 1 "
Rosebud of Bellevue 7702	50	14 " 10 "			
Lizzie C. 7713	50	14 " 0 "	*Total, 8 cows.*		

THORNDALE 2582.

Solid light fawn; black switch. Dropped November 13th, 1876. Bred by E. Thorne, New York. Sire, Balsora 2357. Dam, Katinka 5264.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Maggie McM. 14,073	50	19 lbs. 9 oz.	Oakland Girl 11,103	50	14 lbs. 12½ oz.
Jennie ——	50	18 " 3 "	Florie May 10,728	50	14 " 8 "
Almah of Oaklands 11,102	50	16 " 14 "	*Total, 5 cows.*		

DUKE OF BRANDYWINE 2213.

Color, brown, tinged with gray; star in face; white spot on back; lower part of legs white. Dropped July 11th, 1876. Bred by Isaac Morgan, Parkersville, Pa. Sire, Doctor H. 2132. Dam, Lillie Morgan 4752.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Lydia Darrach 2d 8056	50	16 lbs. 0 oz.	Lydia Darrach 5th 16,577	50	15 lbs. 0 oz.
Lydia Darrach 3d 10,662	50	16 " 0 "	*Total, 3 cows.*		

VICTOR (P. 148 J. H. B.—H. C.)

Color, brown; white on left flank; black switch. Dropped April, 1876.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Floribundus 2d 14,949	50	18 lbs. 8 oz.	Lalla Rookh of Sugar Grove 15,882	25	20 lbs. 1 oz.
Dairy Pride 4th 21,681	50	16 " 0 "	*Total, 4 cows.*		
Miss Huelin 22,296	50	14 " 9 "			

OAKLAND GIRL 11,103.

Thorndale Type.

HIGHLAND HERD.

JAMES N. SMITH, LITCHFIELD, CONNECTICUT.

GILDEROY 2107.

Bred by H. Borden-Bowen, Rhode Island. Dropped May 7th, 1876. Sire, Magnetic 1428. Dam, Jeanne Le Bas 2476.

The following is a description of Gilderoy 2107 as the author saw him at "Ferrycliffe," the farm of Dr. H. M. Howe, in July, 1885 :

This noted bull, destined through his progeny to become a famous fountain of richness, is a rare model of symmetry, and at nine years of age well illustrates the remarkable vital energy inherent in an inbred Jersey bull. Every feature indicates a superlative thoroughbred quality, constitution and potency. The barrel is long and well-ribbed ; the back straight ; the loin very broad ; the hips prominent ; the withers thin ; the rump long and high ; the thighs broad and flat ; the forearm powerful ; the legs neat and small ; the neck grandly crested and admirably set upon oblique, sloping shoulders ; the throat clean ; the head shapely, and having a well-arched crown and slender waxy horns ; the face dished ; the eyes mild. The fore escutcheon is large ; the hind escutcheon a good curveline ; the rudimentary udder and teats well-marked ; the scrotum very large ; the foreveins unusually large and prominent ; the tail fine. The hide is delightfully mellow, and of just the right degree of thinness ; the hair one twelfth to one sixteenth of an inch in length, and his whole surface as unctuous and soft to the touch as vaseline. The ears are handsomely fringed with black. His color of coat is mahogany fawn upon the back, dark mulberry or purple black on the head, face, neck and sides. He has some white markings which are bordered with a margin of blue ; the white saddle upon the withers, which is a characteristic feature of many famous historic Jerseys ; white on belly, chest, flanks, and legs, and a white switch. His most remarkable characteristic is his very rich skin color. Within the ears, beneath the elbows, upon the scrotum, the escutcheons, the tip of tail, and from beneath the white markings, there is a brilliant glow of the richest cadmium orange color, and from his dark mulberry face there exudes a golden powder that looks like pollen upon a honey-bee. All his progeny have the handsome, black-fringed, orange-glowing ears and orange-colored skin ; and the Gilderoy cows yield a rich, buff-colored cream, and brilliant, orange-tinted butter. Gilderoy is not excelled by any living bull in this rare coloring, and I know of no herd that approaches that of "Ferrycliffe" in the prevalence of this very desirable feature. All the yearlings and calves in the herd of Dr. Howe show the rich orange-tinted skin.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Princess Mary of Woodlawn 11,663	75	14 lbs. 4 oz.	Queen Mary of Woodlawn 11,659	50	22 lbs. 5 oz.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Chrome Skin 7881	50	20 lbs. 10 oz.
Lactine 10,682	50	17 " 1½ "
Topaz of Woodlawn 11,661	50	16 " 4 "
Lady Alice of the Wilderness 12,207	50	15 " 14 "
Daisy's Daughter ——	50	15 " 2 "
Sweet Sixteen 10,682	50	14 " 15 "
Gold Mask 10,727	50	14 " 14 "
Yellow Locust 10,679	50	14 lbs. 10½ oz.
Clover Mel 16,159	50	14 " 9 "
Eugenie 2d 12,733	50	14 " 2 "
Mary of Gilderoy 11,219	50	14 " 4 "
MAMELLE 20,804	25	21 " 8¼ "
TETTE 20,802	25	17 " 6 "
Total, 15 *cows*.		

MASENA 25,732.

Color, fawn and white; white on brisket, right shoulder, left side, hips, flanks, belly and legs; white switch; white tongue. Dropped March 8th, 1876. Bred by H. Talcott. Sire, Kago 1353. Dam, Highland Mary 3d 19,876.

TEST OF MASENA.

Masena was tested at intervals for one year and eleven days, under the supervision of her owner, Mr. P. P. Paddock, the test ending four days previous to dropping her calf, making the time between calves one year and fifteen days.

The yield was as follows:*

One year, 8995 lbs. 8 oz. of milk................892 lbs. 2 oz. of butter.

The next eleven days, 105 lbs. 8 oz. of milk...... 10 " 1 " " "

Last four days, milk not used; total.............902 lbs. 3 oz. of butter, from 9101 lbs. of milk, or ten and one quarter (10¼) lbs. of milk to a pound of butter.

Cost of feed for one year and fifteen days:

To 1500 lbs. middlings	$18.75
" 1600 " corn meal	20.00
" 1100 " barley meal	13.75
" 600 " bran	6.00
" 450 " ground oats	5.62
" 30 bushels potatoes	7.50
" 1800 lbs. hay	10.80
" Pasturing	10.00
Total	$92.42
902 lbs. 3 oz. butter	270.65
Net profit	$178.23

* Estimated in part.

MOLLIE GARFIELD 12,172.

Color, dark fawn; little white. Dropped 1876. Sire, Bell Caliph 1432. Dam, Maple Dale 2907.

MOLLIE GARFIELD AND TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Mollie Garfield 12,172 .	100	22 lbs. 12 oz.	Duchess of Manchester 20,838	50	14 lbs. 0 oz.
Mollie Garfield 2d 18,662	100	15 " 14 "	*Total, 4 cows.*		
Dollie Dale 16,140 . .	100	15 " 7 "			

NANCY LEE 7618.

Color, cream fawn; black points. Dropped 1876. Imported by E. P. P. Fowler, 1878.

NANCY LEE AND TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Nancy Lee 7618 . . .	100	26 lbs. 8½ oz.	Lizzie C. 7713	50	14 lbs. 0 oz.

Total, 2 cows.

1877.

BULLS.

TORMENTOR 3533.

Color, gray, with dark shadings; small star; white on belly, front of hind legs, and fore-ankles. Dropped March, 1877. Bred by John Arthur, St. Mary's, Jersey. Imported August 23d, 1878, by Campbell Brown, Spring Hill, Tenn. Sire, Khedive, P. 103 J. H. B.—H. C. Dam, Angela, F. 1607 J. H. B.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Little Torment 15,581 . .	50	23 lbs. 2½ oz.	**ETHLEEL 2d** 32,291 .	25	**30** lbs. **15** oz.
Ethleel 18,724	50	19 " 14 "	Maquilla 24,043	25	20 " 1 "
Daisy Brown 12,213 . .	50	17 " 6½ "	Toltec's Fancy 27,172 . .	25	17 " 6 "
Ruby Wray —— . . .	50	16 " 0 "	Prize Rose 16,309 . . .	25	15 " 1 "
Rose of Oxford 13,469 . .	50	15 " 14½ "	Deletta 21,305	25	14 " 15½ "
Romping Lass 11,081 . .	50	15 " 0 "			
Ada Minka 15,562 . . .	50	14 " 0 "	*Total, 12 cows.*		

WANDERER 3014.

Color, solid; black points. Dropped March 15th, 1877. Bred by J. A. Hayt. Sire, Signal 1170. Dam, Cosette 3874.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name	Blood, Per Cent.	Butter Yield in Seven Days.
Fadette of Verna 3d 11,122	50	22 lbs. 8½ oz.	**EVELINA OF VERNA** 10,971	50	**19** lbs. **10½** oz.
Fairy of Verna 2d 10,973	50	20 " 3¾ "	*Total, 4 cows.*		
Hilda A. 2d 11,120	50	20 " 0 "			

SAMSON JR. 2723.

Solid color, except switch. Dropped March 22d, 1877. Bred by W. B. Dinsmore, New York. Sire, Dexter of Staatsburgh 1942. Dam, Susie 2d 778.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Calista of Newark 13,296	50	15 lbs. 9 oz.	Flora Lee 13,294	50	14 lbs. 1 oz.
Phœbe N. 25,401	50	15 " 3 "	*Total, 3 cows.*		

LE BROCQS PRIZE 3350.

Color, dark brown; black points. Sire, Horace (P. 94 J. H. B.—H. C.) Dam, Matin 1829. Le Brocq's Prize, dropped 1877, won First Prize over Jersey in 1878. Imported by Colonel George E. Waring, Jr., 1878, for Churchman & Jackson.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Fan's Grouville Beauty 10,079	50	19 lbs. 3 oz.	Birdie Le Brocq 17,263	50	14 lbs. 0 oz.
Marea 10,167	50	17 " 10 "	Elinor Wells 12,060	50	14 " 0 "
Viva Le Brocq 13,702	50	17 " 7 "	Le Rosa 10,078	50	14 " 0 "
Eclipse 14,427	50	15 " 12 "	Nutley's Alma 13,581	50	14 " 0 "
Prize Rose 16,309	50	15 " 1 "	Island Dots 17,003	25	14 " 9 "
Jennie Williams 29,058	50	15 " 0 "	Frances C. Magnet 22,904	12½	14 " 13½ "
Medrie Le Brocq 8888	50	14 " 7 "	*Total, 13 cows.*		

COWS.

PRINCESS 2d 8046.

Color, light buckskin fawn; white on belly; black tongue; white switch; yellow skin; large spheroidal udder; selvedge escutcheon of the first order. Dropped February 22d, 1877. Sire, Khedive, P. 103 J. H. B.—H. C. Dam, Princess 402. Imported by Edward P. P. Fowler, 1879.

Sold at auction in New York, 1882, for $4800. Tested February 20th to 27th, 1884, by John V. N. Willis; for seven days yielded twenty-seven pounds ten ounces of butter. Officially tested by Committee of the American Jersey Cattle Club in March, 1885, and yielded in seven days forty-six pounds twelve and one half ounces of butter.

PANDORA OF STAATSBURGH 3d 6497.

Solid color; black switch. Dropped April 1st, 1877. Bred by W. B. Dinsmore, New York. Sire, Faro 1749. Dam, Pandora of Staatsburgh 3280.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Maggie McM. 14,073	50	19 lbs. 9 oz.	Almah of Oakland 11,102	50	16 lbs. 14 oz.
Pandothro 22,383	50	17 " 5 "	*Total, 3 cows.*		

1878.

BULLS.

FARMER'S GLORY 5196 (*F. 274 J. H. B.—H. C.*)

Color, silver gray, with slate shadings; black points. Dropped March 1st, 1878. Bred by F. Le Brocq, Jersey. Sire, Grey King, P. 169 J. H. B.—H. C. Dam, Bonheur 14,942.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Beulah de Gruchy 13,480	50	22 lbs. 2 oz.	Glory of Elmarch 21,521	25	15 lbs. 13½ oz.
Rozel Lass 20,268	50	19 " 9½ "	Baron's Rosette 25,988	25	15 " 4 "
Maritana 12,039	50	16 " 3½ "	Queen of Ashantee 2d 16,657	25	14 " 3½ "
Geneva 13,220	50	15 " 11 "	Nervine 25,932	25	14 " 1½ "
Farmer's Floss 17,773	50	15 " 11 "			
Marie S. 12,043	50	15 " 6 "			
Well Done 25,987	25	19 " 4 "	*Total, 11 cows.*		

For Farmer's Glory Type, see portraits of Farmer's Maid and Surprise of Maple Shade in frontispiece.

RAMBLER OF ST. LAMBERT 5285.

Color, light fawn; black switch; black tongue. Dropped June 11th, 1878. Bred by Romeo H. Stephens, St. Lambert, Canada. Sire, Stoke Pogis 3d 2238. Dam, Bessy of St. Lambert 5482.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Rose of St. Lambert 20.426	50	21 lbs. 3½ oz.
Rioter's Ruth 14,882 . .	50	14 " 12 "
Rioter's Beauty 14,894 . .	50	14 lbs. 0 oz.
Total, 3 cows.		

1879.

BULLS.

CATONO 3761.

Solid fawn, except white fleck upon left shoulder; full black points. Dropped January 15th, 1879. Bred by A. E. Renouard, St. Lawrence, Jersey. Sire, Cato, P. 178 J. H. B.—H. C. Dam, *Ona* 7840.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Rosona 12,956	50	16 lbs. 7 oz.
Elsie Lane 13,302 . . .	50	15 " 4 "
Betsona 16,776	50	14 lbs. 3 oz.
Total, 3 cows.		

KING, P. 238 J. H. B.—C.

Color, light brown; white patch between body and right hind leg. Dropped February, 1879. Bred by F. Le Brocq, Jr., St. Owen. Sire, Young Prince, P. 182 J. H. B.—H. C. Dam, Judy, F. 1590 J. H. B.—H. C.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Fillpail 2d 24,388 . . .	50	25 lbs. 2 oz.
KHELULA 17,970 . . .	50	19 " 8 " 14 " 6½ "
King's Trust 18,946 . . .	50	18 lbs. 0 oz.
Granny's Gem 30,406 . .	50	16 " 5½ "
Total, 4 cows.		

COWS.

OXFORD KATE 13,646.

Color, light brown fawn ; white on flanks, breast, left shoulder and legs ; brown and white switch. Bred by Francis Le Brocq, St. Peters, Jersey. Dropped February 20th, 1879. Imported by T. S. Cooper, August, 1881. Bought at auction, New York, for $3550. Oxford Kate has a nearly perfect flandrine escutcheon. She won the First Guenon Prize, a silver cup, at the Royal Jersey Show, May 26th, 1881. In America she won Sweepstakes Prize, as best cow, New Jersey State Fair, 1882, and in Virginia, 1885. Made thirty-nine pounds twelve ounces of butter in seven days' official test for Mrs. S. M. Shoemaker, Baltimore. A very choice model of perfection in a Jersey.

MARY ANNE OF ST. LAMBERT 9770.

Color, smoky bay fawn ; black points. Bred by Romeo H. Stephens, St. Lambert, near Montreal, Canada. Sire, Stoke Pogis 3d 2238. Dam, Lolly of St. Lambert 5480. Dropped March 26th, 1879. This cow is noted for having made the largest annual test and the largest official test for seven days previous to February, 1885. Her general appearance indicates remarkable strength of constitution, and her wonderful tests fully confirm the evidence of great capacity given by her outward conformation, while her ability to digest and assimilate food is phenomenal, and her power of secretion of cream is marvellous. The cow is large for the breed, weighing one thousand and fifty pounds at six years, very long in the barrel, very deep in the chest and shoulder, very wide in the "crops," and, though styled a cow of the parallel type, shows much of the wedge form, being deep in the loin, and of great breadth behind. Her udder is of the spheroidal type, very long, very broad, but not of great depth. One of her most notable features is a very large fore escutcheon, which extends as far as the long foreveins, and sweeps out upon the sides of the capacious belly. The hind escutcheon would be classed as a selvedge of the third order, although it combines many features of a flandrine of the first order, in having two udder oval feathers, and in widening out at the top, so as to include the vulva. The cow verifies the theory of Guenon in the quantity of milk she yields and the time of going dry. At from five to six years old she yielded eight hundred and sixty-seven pounds fourteen and three quarter ounces of butter ; in one week, on five quarts of grain, twenty-four pounds eleven ounces of butter, and when fed thirty-five quarts of grain, twenty-seven pounds nine ounces. When six and a half years old her official test, elsewhere reported in full, yielded thirty-six pounds twelve

and one quarter ounces of butter in seven days. For this test she was prepared by a gradual increase of feed for two months, so that she was able to consume from thirty-five to fifty quarts of grain daily.

1881.

BULLS.

CHAMPION MAGNET 6480.

Color, solid, except white tip to switch. Dropped April 13th, 1881. Bred by W. B. Montgomery, Starkville, Miss. Sire, Champion of America 1567. Dam Mink 2548.

TESTED DESCENDANTS.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Marie C. Magnet 22,903	. 50	15 lbs. 8 oz.	Clara C. Magnet 31,563	. 50	14 lbs. 11 oz.
Frances C. Magnet 22,904	. 50	14 " $13\frac{1}{2}$ "	*Total*, 3 *cows*.		

Additional Tests for previous Tables.

PANSY 8.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Clara C. Magnet 31,563	. $4\frac{11}{16}$	14 lbs. 11 oz.	Duchess of Argyle 4th 7571	$3\frac{1}{8}$	14 lbs. 1 oz.
Mellie Argyle 20,609 .	. $3\frac{21}{32}$	14 " 6 "	Countess of Lorne 20,822 .	$2\frac{49}{64}$	14 " 14 "
Bessie R. 13,503 . . .	. $3\frac{29}{32}$	16 " 0 "	Clematis 3d 6653	$1\frac{9}{16}$	14 " 1 "
Madame Argyle 19,476	. $3\frac{29}{64}$	14 " 1 "			
Julia Anna 16,463 . .	. $3\frac{1}{8}$	17 " 0 "	*Total*, 162 *cows*.		

SPLENDID 2.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Nancy Rex 11,743 . . .	. $11\frac{13}{32}$	16 lbs. 0 oz.	Duchess of Argyle 4th 7571	$3\frac{1}{8}$	14 lbs. 1 oz.
Toltec's Fancy 27,172 .	. $6\frac{1}{4}$	17 " 6 "	Countess of Lorne 20,822 .	$2\frac{11}{16}$	14 " 14 "
Ida of Coal Hill 12,542 .	. $4\frac{11}{16}$	15 " 0 "	Madame Argyle 19,476 . .	$2\frac{11}{16}$	14 " 1 "
Maquilla 24,043	. $3\frac{1}{8}$	20 " 1 "	Lady Panalphrex 17,400 .	$1\frac{53}{64}$	23 " 9 "
Mellie Argyle 20,609 .	. $3\frac{1}{8}$	14 " 6 "	Belmeda 6229	$1\frac{9}{16}$	18 " 12 "
Celia Belle 5865	. $3\frac{1}{8}$	14 " 3 "	*Total*, 116 *cows*.		

ALBERT 44.

Name	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Nancy Rex 11,743 . . .	25	16 lbs. 7 oz.	Countess of Lorne 20,822	. $10\frac{15}{16}$	14 lbs. 14 oz.
Duchess of Argyle 4th 7571	$18\frac{3}{4}$	14 " 1 "	Bessie R. 13,503	$9\frac{5}{8}$	16 " 0 "
Mellie Argyle 20,609 . .	$15\frac{5}{8}$	14 " 6 "	Madame Argyle 19,476 .	. $7\frac{13}{16}$	14 " 1 "
Julia Anna 16,463 . . .	$12\frac{1}{2}$	17 " 0 "	Lady Panalphrex 17,400	. $6\frac{1}{4}$	23 " 9 "
Clematis 3d 6653	$12\frac{1}{2}$	14 " 1 "	*Total*, 130 *cows*.		

McCLELLAN 25.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent	Butter Yield in Seven Days.
Mellie Argyle 20,609 . .	$19\frac{17}{32}$	14 lbs. 6 oz.	Madame Argyle 19,476 .	$9\frac{49}{64}$	14 lbs. 1 oz.
Duchess of Argyle 4th 7571	$14\frac{1}{16}$	14 " 1 "	Julia Anna 16,643 . . .	$3\frac{1}{8}$	17 " 0 "
Countess of Lorne 20,822 .	$10\frac{15}{16}$	14 " 14 "	Clara C. Magnet 31,563 .	$3\frac{1}{8}$	14 " 11 "
Bessie R. 13,503	$3\frac{29}{32}$	16 " 0 "	*Total*, 69 *cows.*		

PANSY 6th 38.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Duchess of Argyle 4th 7571	$9\frac{3}{8}$	14 lbs. 1 oz.	Countess of Lorne 20,822 .	$5\frac{17}{32}$	14 lbs. 0 oz.
Mellie Argyle 20,609 . .	$7\frac{11}{16}$	14 " 6 "	Madame Argyle 19,476 . .	$3\frac{29}{64}$	14 " 1 "
Julia Anna 16,643 . . .	$6\frac{1}{4}$	17 " 0 "			
Bessie R. 13,503 . . .	$6\frac{1}{4}$	16 " 14 "	*Total*, 68 *cows.*		

PIERROT 636.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Palestine Pierrot 24,099 .	$37\frac{1}{2}$	14 lbs. 6 oz.	Madame Argyle 19,476. .	$12\frac{1}{2}$	14 lbs. 1 oz.
Countess of Lorne 20,822 .	$12\frac{1}{2}$	14 " 14 "	*Total*, 55 *cows.*		

LANDSEER 331.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Toltec's Fancy 27,172 . .	25	17 lbs. 6 oz.	Maquilla 24,043	$12\frac{1}{2}$	20 lbs. 1 oz.

Total, 20 *cows.*

LADY MARY 1148.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Clara C. Magnet 31,563 .	$18\frac{3}{4}$	14 lbs. 11 oz.	Czaretta 17,358	$9\frac{3}{8}$	14 lbs. 7 oz.

Total, 96 *cows.*

MARIUS 760.

Name.	Blood, Per Cent	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Clara C. Magnet 31,563 .	25	14 lbs. 11 oz.	Czaretta 17,538	$12\frac{1}{2}$	14 lbs. 7 oz.

Total, 86 *cows.*

ROB ROY 17.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Nancy Rex 11,743	12½	16 lbs. 7 oz.	Madame Argyle 19,476	12½	14 lbs. 1 oz.
Mellie Argyle 20,609	12½	14 " 6 "	Countess of Lorne 20,822	6¼	14 " 14 "

Total, 51 *cows.*

TOM DASHER 420.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Julia Anna 16,463	25	17 lbs. 0 oz.	Countess of Lorne 20,822	6¼	14 lbs. 14 oz.
Clematis 3d 6653	12½	14 " 1 "	Mollie Argyle 20,609	6¼	14 " 6 "
Duchess of Argyle 4th 7571	12½	14 " 1 "	Madame Argyle 19,476	6¼	14 " 1 "
Bessie R. 13,503	6¼	16 " 0 "	*Total*, 34 *cows.*		

PIERROT 2d.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Countess of Lorne 20,822	12½	14 lbs. 14 oz.	Madame Argyle 19,476	12½	14 lbs. 1 oz.

Total, 21 *cows.*

EMBLEM 90.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
La Fantine 24,489	25	16 lbs. 8 oz.	Rochelle 15,574	12½	15 lbs. 10 oz.
Duchess of Bloomfield 3d 15,580	18¾	15 " 1 "	Czaretta 17,358	6¼	14 " 7 "
Maquilla 24,043	12½	20 " 1 "	*Total*, 36 *cows.*		

OONAN 1485.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Toltec's Fancy 27,172	25	17 lbs. 6 oz.

Total, 4 *cows.*

COUCH'S LILY 3237.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Nancy Rex 11,743	25	16 lbs. 7 oz.	Lady Panalphrex 17,400	12½	23 lbs. 9 oz.

Total, 26 *cows.*

STANDARD BUTTER TESTS

SHOWING GREAT RICHNESS OF QUALITY UPON GRASS ALONE, HAY ALONE, OR GRASS, WITH NOT MORE THAN FOUR QUARTS OF GRAIN DAILY.

> "Ye are the Hebes who dip
> And lift from the loam to the lip
> The nectar, whose plethoric flood
> Is tinted and turned into blood."

	lbs.	oz.
JERSEY BELLE OF SCITUATE 7828. At six years old a test of one year yielded of the best quality of very deep yellow butter,	705	0
Feed: in summer, pasture, two quarts wheat bran daily; in winter, rowen hay, two quarts wheat bran daily.		
At nine years old test for seven days	25	3
Feed first four days: pasture by day; at night two quarts wheat shorts, one quart corn meal, and cut grass. Feed, last three days: pasture by day; at night two quarts wheat shorts, two quarts corn meal, and cut grass, or three and three seventh quarts of grain daily.		
MAUD LEE 2416. Feed, good rowen pasture and four and one half pounds corn meal daily (equivalent to three quarts)	23	0
JENNY DODO H. 14,448. Grass only, hill pasture	21	8
RECEPTION 8557. Grass and four quarts corn meal	19	8
CHRISTMAS NANNIE 4075. Good pasture, one quart corn meal, three quarts wheat middlings daily	19	7
BRIGHTEYES 2d 2290 (twelve years old). Hay, corn stover, pasture, beets, carrots, four quarts corn meal	19	6
ALLURING 5541. Grass only	19	5
BELLE OF INGLESIDE ——. Grass only	19	0
QUEEN OF DELAWARE 17,029. Good timothy pasture, just heading out.	18	13
GOLD EAR 2d 3592. Grass, hay, beets, carrots, four quarts corn meal.	18	2
PYROLA 4566. Grass only	18	6
MAMIE COBURN 3798. Grass only	18	4
VOLIE 19,645. Grass only	18	1
MELIA ANN 5444. Grass only	18	0½
PATTERSON'S BEAUTY 4760. Grass only	18	0
RENALBA 4117. Pasture, hay, and four quarts of grain	17	14½
DORA BELL OF SHELLY'S ISLAND 9394. Grass only	17	10
BRUNETTE OF SCARSDALE 13,276. Grass only	17	8
WYBIE 595. Grass only	17	4½

	lbs.	oz.
Attractive Maid 16,925 (three years old). Fair pasture, two quarts cottonseed meal	16	13
Dusky 2525. Grass only	16	10
Couch's Lily 3237. Grass, one pound oatmeal, one half pound corn meal	16	9
Golden Skin 10,861. Pasture and green rye	16	8
Leonice 2d 8342. Pasture, four quarts of bran	16	8
Palestine 3d 1104. Grass only	16	8
Zithey 9184. Grass only	16	7
Gala 1375. Grass only	16	7
Belle of Patterson 5664. Good "blue grass" pasture	16	6
Olie's Lady Teazle 12,307. "Blue grass" pasture	16	5
Corinna 2d 6594. Grass, hay, corn stover, beets, carrots, four quarts corn meal	16	5
Flora of St. Peter's 8622. Lucern by day; pasture by night	16	5
Corn 10,504. Pasture of "blue grass" and white clover	16	2
Moth of St. Lambert 9775. Test eight and one half months from calf. Pasture, two and one half quarts barley meal	16	2
Lydia Darrach 2d 8056. Grass only	16	0
Lydia Darrach 3d 10,662. Grass only	16	0
Tilda 3720. Grass only	16	0
Gold Lace 10,726. Grass only	16	0
Maid of the Elms 6960. Grass and one quart bran	16	0
Thaley 14,299 (two years old). Grass only	16	0
Countess 114. Grass only	16	0
Cream of Java 23,507. Grass only	16	0
Lady Alice of the Wilderness 12,207. Pasture and green rye	15	14
Lucy Gray 2746. Grass only	15	13
Matilda 5th 18,068. Grass and four quarts corn meal	15	12
Sylvia 687. Grass only	15	8
Pinafore 2d 15,072. Grass only	15	8
Lustre 2062. Pasture of mixed grass	15	8½
Referette 15,209. Grass only	15	8
Kalmia 4561. Grass only	15	8
Eupidee's Perfection 20,175 (two and one half years old). Grass and corn fodder	15	4
Dorothy of Bovina 9373. Pasture	15	4
Dove Dee 18,059 (two years old). Pasture	15	3
Lady Adams 2d 6529. Pasture, four quarts grain daily	15	3
Grace's Nightingale 19,855. Grass only	15	3

		lbs.	oz.
LASSIE 1134.	Grass only	15	1½
ALDARINE 5301.	"Blue grass pasture."	15	1½
HENNIE 3335.	Grass only	15	0
OXALIS 2d 15,631.	Grass only	15	0
LYDIA DARRACH 5th 16,577.	Grass only	15	0
MA BELLE 4942.	DRY HAY	15	0
WINSOME OF IPSWICH 9213.	Grass only	15	0
DELETTA 21,305.	Grass only	14	15½
MISS BADEN BADEN 14,760.	Grass only	14	14½
VELVETEEN 7703.	Grass only	14	13½
PHYLLIS OF HILLCREST 9067.	Grass only	14	12
ESTRELLA 2831.	Grass only	14	12
PEGGY FORD 21,713.	Grass only	14	10
KOSI 3431.	Pasture of mixed grasses	14	7
BROWN PRINCESS 30,941.	Grass only	14	8
DEL OF WILLOW FARM 22,461.	Grass only	14	8
FLORIE MAY BAKER 10,728.	Grass only	14	8
GILDA 2779 (at three years old).	Grass only	14	6
FIDES 2d 1576.	Grass only	14	6
LOBELIA 2d 6650.	Timothy and clover pasture	14	6
LILLIE POPE 8589.	Grass only	14	5
LADY PALESTINE 2769.	Pasture and bran mash	14	5
ENERGY 22,016.	Grass only	14	5
TIDY OF ST. LAMBERT 31,114.	Four quarts grain	14	2
JEANNIE PLATT 6005.	Grass only	14	2
WEBSTER'S PET 4103.	Grass only	14	2
ANGELA 1682.	Grass only	14	2
QUEEN OF PROSPECT 11,997.	Timothy and clover pasture	14	2
TAGLIONI 9182.	Grass only	14	1
LADY CAROLINE OF ST. AUBINS 11,372.	Grass only	14	0
ERITH 4564.	Grass only	14	0
DAISY OF CLERMONT 3492.	Grass only	14	0
OLYMPH 17,957.	Grass only	14	0
LE ROSA 10,078.	Grass only	14	0
SULTAN'S LILY 18,099 (two years old).	Four quarts grain	14	0
LADY YOUNG 16,668.	Grass only	14	0
PUTNAM BELLE 12,116.	Grass only	14	0
BOUNTY 1606.	Grass only	14	0
PET ANNA 1608.	Good pasture	14	0
FIDELIA 5817.	Grass only	14	0

	lbs.	oz.
Elinor Wells 12,608. Grass only	14	0
St. Perpetua 2d 5557. Grass only	14	0
Niobe 99. Grass only	14	0

Total, 97 cows.

OFFICIAL BUTTER TESTS.

1882.

Bomba 10,330.

REPORT.

To the Directors of the American Jersey Cattle Club:

In accordance with my proposal, which you approved at your last meeting, I went to Darlington to witness the test of Mr. Darling's cow Bomba, and beg to submit to you the following report:

This test was taken for the week from October 6th to 12th, inclusive, and during this time Bomba was milked in my presence night and morning; her milk was weighed personally by me directly after each milking, and it was never out of my sight until it was placed under seal in a small cellar room, set apart for that purpose.

The milk was strained into old-fashioned five-quart pans, and taken out to be churned at the end of four days. No one entered the room except in my presence, the one window being sealed with my private seal, and the door, beside the seal, being fastened with a Swedish padlock.

The milk and cream at the end of four days, when it became loppered, were churned together in a small Blanchard churn.

Having completed the week's milkings, and superintended the first three churnings, I was obliged to return home; but Mr. John Mayer, an old personal friend, and manager of Mr. T. A. Havemeyer's Mountain Side Farm, kindly consented to take my key and seal, and to conduct the fourth, fifth and sixth churnings, the results of which he reported to me daily by telegraph.

The pasture into which Bomba was turned night and morning after milking contained about four acres, and it had been seeded in the spring with clover and oats. Four or five colts had fed there for the past two months, but the grass was from two to four inches high, and thickly set. The grain I fed to her myself night and morning, just before milking-time. On Wednesday, October 11th, after Bomba had been out all day in a northeast storm, at my advice she was put into a loose box, and had a warm mash with plenty of corn fodder. You will notice the effects of this in her last day's yield.

On Monday, previous to the test, a swelling about the size of a goose-egg was discovered upon Bomba's udder, midway between and just above the two left-hand

TABLE OF BOMBA'S TEST.

Date of Milking.	Weather.	Average Thermometer.	Amount of Grain Fed Night and Morning at each Feed.	Amount of Milk A.M.	Amount of Milk P.M.	Date of Churning.	Temperature of Milk and Cream.	Condition of Cream and Milk.	Time Occupied with each Churning.	Amount of Butter for each Churning Washed and Worked.
October 6..	Rain	62°	2 qts. Wheat Middlings. 1 qt. Corn Meal.	16 lbs. 10 oz.	15 lbs. 1 oz.	October 10.	62°	Sour and loppered.	30 minutes.	3 lbs. 10½ oz.
" 7..	Fog, clearing, P.M...	60°	2 qts. Wheat Middlings. 1 qt. Corn Meal.	15 " 1 "	14 " 2 "	" 11.	62°	Sour and loppered.	45 "	3 " 2½ "
" 8..	Clear...........	70°	1½ qts. Middlings. 1 qt. Corn Meal. 1 pt. Linseed Meal.	14 " 14 "	13 " 13 "	" 12.	61°	Sour.	35 "	2 " 12 "
" 9..	Fog, clearing, 10 A.M.	62°	1⅛ qts. Middlings. 1 qt. Corn Meal. 1 pt. Linseed Meal.	15 " 3 "	14 " 6 "	" 13.	60°	Loppered.	45 "	3 " 4 "
" 10..	Clear and colder	58°	2 qts. Middlings. 1 pt. Corn Meal. 1 pt. Linseed Meal.	13 " 4 "	15 " 4 "	" 14.	60°	"	45 "	2 " 13 "
" 11..	Cloudy, rain, wind N. E.. ..	50°	2 qts. Middlings. 1 qt. Corn Meal. 1 pt. Linseed Meal. Bran Mash.	14 " 4 "	14 " 4 "	" 15.	60°	"	40 "	2 " 11 "
" 12..	Rain, wind N. E.	48°	2 qts. Middlings. 1 pt. Corn Meal. 1 pt. Linseed Meal.	14 " 15 "	16 " 5 "	" 16.	62°	"	25 "	3 " 6½ "

Total Yield of Milk, 205 lbs. 6 oz.

Total Yield of Butter, 21 lbs. 11½ oz.

DEERFOOT FARM, SOUTHBORO', MASS., October 21, 1882.

E. BURNETT.

teats; there was some inflammation at that time, but it gradually subsided, and before the end of the week's test was almost gone.

Bomba 10,330, dropped October 12th, 1878, by Duke of Darlington 2460, out of Beauty of Darlington 5736; weight, 880 pounds; last calf, June 16th, 1882. Her color is fawn, with black points. She is of a perfect wedge shape, with deep barrel. Her udder is almost perfect in form, with large and wide-spread teats, and meandering milk-veins, larger than a man's thumb, and corresponding milk-holes.

The escutcheon is curveline, but not remarkable. Extending down from the vulva are large swelling veins, so rarely found, except in our best cows. She shows but little richness of skin, and has considerable hair on the udder. The horns are small and without much quality, rather straight, and running up abruptly from the head, like the Alphea cows, but her butter is of good quality and color. Her general form is like Jersey Belle of Scituate, with a modified Eurotas head. She shows splendid constitution, and a perfect indifference to all surroundings except her feed.

Lydia Darrach 4903.

REPORT.

Mr. John I. Holly, *President:*

In accordance with the appointment made by you to witness the test of Mr. Worth's cow Lydia Darrach, we beg to make the following report:

	Thermometer. A.M.	Thermometer. P.M.	Pounds Milk. A.M.	Pounds Milk. P.M.	Cottonseed Meal. A.M. and P.M.
May 4	..	79°	..	18	1 qt.
" 5	50°	57°	16¼	16¾	....
" 6	54°	63°	16¾	16¾	¼ pt.
" 7	58°	63°	15¾	16¾	1 pt.
" 8	55°	82°	16¾	17¾	1½ pts.
" 9	59°	68°	17¼	17¾	1½ pts.
" 10	52°	53°	16¾	17¼	1 pt.
" 11	66°	..	18	..	....

With the above varying quantity of cottonseed meal she received regularly, each morning and evening, two quarts of corn meal, two quarts of ship-stuff, and one peck of cut hay.

BOMBA 10,330.

Alphea-Rioter Type.

DARLINGTON HERD.

A. B. DARLING, RAMSEY'S, NEW JERSEY

Total yield of milk, two hundred and thirty-eight and a half pounds. Total yield of butter, seventeen pounds fourteen ounces.

The cow having been milked, as usual, on that morning, the test was begun with the milking of May 4th, and was completed on the morning of May 11th, 1883. During the seven days Lydia Darrach was fed and milked in my presence every morning and evening at six o'clock; her milk was weighed personally by me, directly after each milking, and was never out of my sight until it was put in a Cooley Creamer, which was securely fastened by me with lock and key. I carried the key at all times.

The result for the first half of the week (seven milkings) was one hundred and seventeen pounds of milk, the cream from which was churned in thirty-six hours after the last milking, in a small dash churn, and the butter came in twelve minutes. After it had been thoroughly worked, and before the addition of salt, it weighed nine pounds eight and a half ounces of solid butter. The yield of the last seven milkings, completing the week's test, was one hundred and twenty-one and a half pounds; the cream from this was churned twelve hours after the last milking, and the butter did not come until the churning had been going on an hour and thirty minutes. The quality of the butter from both churnings was most excellent, firm, of good grain, and of high color. It was apparent, when too late to remedy the mistake, that the last churning was done before the cream had properly ripened, as four and a half pounds more milk (yielding more cream than was first churned) produced one pound three ounces less butter. The skimming was done by me after the milk had been set twelve hours, by drawing off the milk from the Cooley can; some milk was retained with the cream at each skimming.

Lydia Darrach is mulberry fawn. Dropped February 22d, 1886; sired by Doctor H. 2132, out of Bertha Morgan 4770. She weighed at end of the test eight hundred and fifty-five pounds. She calved February 16th, 1883, and was served April 6th, 1883.

Note.—Lydia Darrach has lost the use of the left fore-quarter of her udder, and only gives milk out of three teats, which must be detrimental to a larger yield. Had her bag not been impaired she must have made a much larger yield of butter.

Louis M. Lusson.

Fair Lady 6723 and Cottage Lass 5332.

To Thomas J. Hand, *Secretary:*

Under and by virtue of the letter of William J. Webster as to official test of Fair Lady and other cows of Mr. William J. Webster, President of Columbia Jersey Cattle Company, I certify that I tested for Mr. William J. Webster the following cows:

Test of **Cottage Lass 5332.**

Date.	Evening.		Morning.		Total.		Butter.		Churned.
	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	
May 16.	20								
" 17.			15	11	35	11	2	3	May 19.
" 17.	15	9							
" 18.			13	2	28	11	2	7	" 21.
" 18.	13	1							
" 19.			15	11	28	12	2		" 22.
" 19.	14	9							
" 20.			16	6	30	15	2		" 23.
" 20.	13	14							
" 21.			16		29	14	1	13	" 24.
" 21.	15	6							
" 22.			16	8	31	14	2	3	" 25.
" 22.	13	3							
" 23.			18	13	31	15	1	14	" 26.
					217	12	14	8	

This test was made at same continuous testing of Mr. Webster's cows, as requested, and under supervision of the same gentlemen, and, as will be seen, this is a half sister of Fair Lady. The two cows are handsome and well-formed, fawn color, neat head and horns, and weigh from about eight hundred to eight hundred and fifty pounds.

(Signed) M. C. Campbell.

Test of **Fair Lady 6723.**

The test of Fair Lady was commenced on the evening of May 23d, under the supervision of Mr. C. O. Nicholson, a gentleman of integrity whom I called in to assist in making the test, as I could not be present during the test all of the time. She had commenced a test a week before, and, owing to the fact that she was in season, and the sickness of her milkman, only made fourteen pounds eleven and a half ounces, and was retested under request of Mr. Webster, the test commencing on the evening of the 23d. She was milked dry at usual time on the morning of the 23d, and evening of 23d commenced saving milk for the test.

Test of Fair Lady 6733.

Date.	Evening.		Morning.		Total.		Butter.		Churned.
	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	
May 23............	17								
" 24............			16		33	8	2	15	May 26.
" 24............	19	6							
" 25............			16	8	35	14	2	7	" 28.
" 25............	20	4							
" 26............			15	1	35	10	3	2	" 28.
" 26............	14	12							
" 27............			16		30	12	2	5	" 29.
" 27............	18								
" 28............			13		31		2	9	" 31.
" 28............	14	10							
" 29............			17		31	11	2	5	June 1.
" 29............	13	14							
" 30............			20	8	34	6	2	5	" 2.
					232	13	18		

This was dry, unsalted butter, and when reworked and salted in the presence of T. L. Porter made seventeen pounds eight ounces of merchantable gilt-edge butter.

May 31st. Evening, 28 lbs. 2 oz.; morning, 13 lbs. 0 oz.; total, 41 lbs. 2 oz.; butter, 3 lbs. 12 oz.; churned June 2d.

This was one day's milk only. She was milked in the presence of T. L. Porter the evening before, and late the next morning, and at the usual time next evening. This was churned in the presence of T. L. Porter, M. C. Campbell, W. J. Webster, and Robin Jones. It was milked in the presence of T. L. Porter and Messrs. Schreiber in the morning and T. L. Porter in the evening, and tested under care of T. L. Porter and Robin Jones.

I certify that I called in to assist in conducting the test T. L. Porter and Robin Jones, and I have perfect confidence in them and rely upon their statements implicitly. I was not present during the whole of the test, but visited frequently during the test.

She was fed lightly during the first part of the week three quarts corn and oats, ground, over half a bucket of cut hay twice daily until the evening of the 29th of May, when she was fed five quarts ground oats, and corn morning and evening.

Till the 2d of June the milk of the last two days of the first seven was too sour, had wheyed badly, and did not churn well.

The forty-one pounds two ounces were churned before it was fully turned, but was well churned, and yielded, as shown, three pounds twelve ounces of firm unsalted butter. This butter being washed with brine before being weighed, and well worked out, when salted and reworked made three pounds thirteen ounces of printed butter. This gained in salting, because it had already been washed out with brine. Our experience through this week was that, however dry it was worked out, it would lose in salting and working if previously washed out with brine, as is usually done with the butter-worker. Major Dobbins, who had the key, and superintended part of the milking, was present during part of the churning, and was called in by me.

(Signed) M. C. Campbell.

Statements are also made and severally signed by the following gentlemen:

C. O. Nicholson.
Thomas L. Porter.
Robin Jones.
William J. Webster.
Joseph J. Dobbins.

Test of **Su Lu 4705.**

Thomas J. Hand, Esq., *Secretary:*

Dear Sir: Under authority given, upon an application of Mr. Campbell Brown, to the President and Board of Directors of the Club, that they appoint some member of the Club to superintend a test of his Jersey cow Su Lu 4705, I took charge of the test, and report the following result:

As I was unable to be present during all the test, Mr. H. J. Fusch and Mr. S. N. Warren, of Spring Hill, Tennessee, known to me as thoroughly reliable gentlemen, acted as my deputies during my absence.

The cow was milked clean twelve hours before the test began.

This was churned in a small Blanchard churn at a temperature of 62°.

The butter was thoroughly worked, then weighed, and one ounce of salt to the pound added, then it was worked and weighed again.

The result, stated below, is in butter salted and ready for market. It was, in texture, color and flavor, fully up to the average yield of the herd.

The cow was on mixed pasture of blue grass and white clover during the test, and was fed twice daily, the ration being as follows:

Three and a half pounds chopped oats; three pounds corn meal; one pound wheat bran; one pound cottonseed meal; one pound cut hay—all mixed with water.

The cow was milked during the test and for four days previously, in the presence of one or more of the undersigned, the milk was weighed by us, and we accompanied it to the dairy, where we saw it placed in a locked box, of which we carried the key.

The churning was done in our presence and the butter weighed by us.

The key was never out of our possession during the test.

THE YIELD FOR THE SEVEN CONSECUTIVE DAYS WAS AS FOLLOWS:

Date.	Morning.		Evening.		Day.		Butter.	
	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.
June 6	16	14	18		34	14	2	7½
" 7	17	2	18	8	35	10	2	15½
" 8	16	2	17	12	33	14	2	10½
" 9	16	4	16	8	32	12	2	10½
" 10	16	12	19	1	35	13	2	9½
" 11	16	3	19	0	35	3	2	4½
" 12	15	10	18	0	33	10	2	5
Total for 7 days					241	12	17	15

Messrs. Fusch and Warren certify to me in writing the correctness of the above statement.

I was myself present during part of the test.

(Signed) H. J. Fusch.
S. N. Warren.
William J. Webster.

1883.

OFFICIAL REPORT OF THE PUBLIC TEST OF JERSEY COW

Value 2d 6844.

BALTIMORE, June 28, 1883.

JOHN I. HOLLY, ESQ., *President of the American Jersey Cattle Club :*

DEAR SIR : In accordance with your request, I went to Baltimore on the 18th inst. as a Committee for the American Jersey Cattle Club, to witness the testing of the Jersey cow Value 2d (6844), the property of Messrs. Watts & Seth, Baltimore. I submit the following statements and tabulated report :

I found that the Maryland Live-Stock Breeders' Association had appointed Messrs. W. H. West, of Baltimore, and Alexander M. Fulford, of Belair, Md., a committee to inspect the test also, and throughout the continuance of the test I have received from these gentlemen polite consideration and cordial co-operation in every effort to make the test accurate in all particulars.

We each witnessed every milking, and the weighing, setting and skimming of the milk, the setting of the cream to "ripen," and the churning, working and weighing of the butter.

The preliminary milking was made at precisely ten o'clock on the 18th, and after the milker had left the cow I proved that she was milked dry by stripping her out myself.

The milking was done three times a day—every eight hours—and was commenced each time with almost exact punctuality.

The scales for weighing the milk and butter were bought on the 18th at the warerooms of Fairbanks & Co., in Baltimore, being selected with the advice and co-operation of your committee and that of the Maryland Breeders' Association. I bought also two padlocks at Mr. Seth's request, and provided myself with tape and sealing-wax, and a verified one-pound weight for testing the scales.

The milk was weighed and then strained into one of the cans of a Moseley Cabinet Creamer, where it was surrounded by ice-water. The creamer was then closed, surrounded by a band of tape, tied and sealed with my seal, and locked also by me with a padlock, and by the Committee of the Breeders' Association with another.

In this creamer the milk was allowed to remain twenty-four hours, when the skim-milk was drawn off and the cream, with some milk, removed to another creamer, where it remained surrounded by water at a temperature of from 62° to 64° to "ripen." This cream-chest was also sealed and doubly locked in the way described above.

Neither the milk nor the cream was ever exposed to view, nor were the locks and seals removed when we, all three, were not present.

The cream was left about two days to "ripen," and was stirred and well mixed whenever the chest was opened.

Churning took place regularly on the fourth day, after milking, except that Thursday's cream was churned Saturday evening, to avoid churning on Sunday.

The churn used was a No. 1 Stoddard Barrel Churn—a very satisfactory one for this purpose.

The butter when it came was gathered only to that degree that, while retaining the granular form, it could be washed easily with cold water in the churn.

When removed from the churn it was thrown upon a Reid Butter-Worker and worked until your committee pronounced it dry and well worked, and the other gentlemen agreed, and weighed unsalted.

This was the only opportunity which we, who were only witnesses of other operations, had for the exercise of our judgment; for Mr. Seth continued the working without objection until we were satisfied that the butter was worked as thoroughly as it could be without endangering its quality. And I may add that the dairy-woman uniformly objected to its being worked so much.

The accuracy of the balance was tested after each weighing, and found to be correct.

The temperature of the cow was taken at least once daily by me. On Monday evening, the 18th, at the time of the preliminary milking, her temperature was found to be alarmingly high (104$\frac{3}{4}$°), indicating a feverish condition.

The weather was excessively hot, sultry and moist, and though retaining her appetite fully, her breath was short and quick. This led to a reduction of her feed, and the weather becoming favorable, she maintained an excellent condition of health throughout the week, but was found to be in heat the day after the close of the test.

Mr. Seth has kindly furnished the accompanying statement of his manner of feeding and treatment, and I may add that Value's appetite has really appeared insatiable. We have repeatedly noticed that all her bedding within reach of her head had been consumed.

The skim-milk tested by the Fesser "Lactoscope" indicated only three quarters of one per cent. of fat, which is much less than common. It was, however, never really blue. The buttermilk was rechurned on two occasions without getting any butter. I conclude, therefore, that there was no loss either in skimming or churning.

On Saturday, the 23d, after the morning's milking had been weighed, on attempting to pour it into the can for setting it was discovered that the faucet was open by the milk running out upon the floor. The remaining milk was at once

Table of Value 2d's Test.

Value 2d 6844. Age 7 years. Weight [illegible] lbs.	Cow's Temperature at 6 A.M.	Weather.	Time of Milking	Weight of Milk at each Milking.	Total Milk each Day.	Date and Time of Skimming.	Date and Time of Churning.	Temperature of Cream.	Time Occupied in Bringing Butter.	Weight of Butter.	Condition of Butter when Weighed.	
	degrees.			lbs. oz.	lbs. oz.			degrees.	minutes.	lbs. oz.		
Tuesday, June 19	103	Sultry and hot.	6 A.M.	14 7		20th, 6.30 A.M.	22d, 9.17 A.M.	62	55	3 6 3/4	Fine granules of good color, worked dry.	Churning, working and weighing witnessed by Messrs. Seth, West, Fulford, Taggart and Weld.
			2 P.M.	14 8 3/4		" 2.30 P.M.						
			10 P.M.	16 7 1/2	45 7 1/4	" 10.30 P.M.						
Wednesday, June 20	102 3/8	Fine and cool.	6 A.M.	15 10 1/2		21st, 6.30 A.M.	23d, 9.25 A.M.	62	50	3 15	Coarse granules of very fine color, easily worked dry.	"
			2 P.M.	14 5 3/4		" 2.30 P.M.						
			10 P.M.	15 4	45 4 1/4	" 10.30 P.M.						
Thursday, June 21	101 3/4	Comfortable, overcast; rain at evening.	6 A.M.	17 1/2		22d, 6.30 A.M.	23d, 8.15 P.M.	62	45	3 7	Fine granules worked into a solid lump.	"
			2 P.M.	12 3 1/2		" 2.30 P.M.						
			10 P.M.	16 11 1/2	45 15 1/2	" 10.30 P.M.						
Friday, June 22	101 3/4	Fine summer day.	6 A.M.	15 9 1/2		23d, 6.30 A.M.	25th, 4.13 P.M.	62	56	3 6 1/2	Rather fine, well worked.	Besides the above, Messrs. G. S. Watts and Frederick von Kapff
			2 P.M.	11 15 1/2		" 2.30 P.M.						
			10 P.M.	19 1 1/2	46 10 1/2	" 10.30 P.M.						
Saturday, June 23	101	Very fine; threatening at evening.	6 A.M.	16 13 1/2		24th, 6.30 A.M.	26th, 10 A.M.	64	20	4 1 1/8	Worked to a solid lump, extra dry.	Witnessed by Messrs. West, Taggart, Fulford, Seth and Weld.
			2 P.M.	15 4		" 2.30 P.M.						
			10 P.M.	16 11 1/2	48 13	" 10.30 P.M.						
Sunday, June 24	101 1/2	Fine.	6 A.M.	16 7		25th, 6.30 A.M.	27th, 8.58 A.M.	65	25	2 15	Coarse granules, very fine color, thoroughly worked.	"
			2 P.M.	13 10 1/2		" 2.30 P.M.						
			10 P.M.	15 7	45 8 1/2	" 10.30 P.M.						
Monday, June 25	101 3/4	Fine, partly overcast.	6 A.M.	17 6		27th, 11.00 A.M.	28th, 9 15 A.M.	64	25	3 15 1/2	Coarse granules, fine color, decidedly overworked.	Final milking witnessed by above and Mr. von Kapff. Churning and weighing witnessed by the before named and Mr. J. G. Clarke, President Maryland Breeders' Association, and Dr. P. S. Field.
			2 P.M.	14 9		"						
			10 P.M.	17 6	49 5	"						

Total Yield of Milk, 327 lbs.

Total Yield of Butter, 25 lbs. 2 11/12 oz.

weighed, and it was thus found that exactly two pounds had been lost. This was the top of the milk in the pail, which had no doubt been standing fifteen minutes or more. It is therefore fair that the butter which it contained (two and two third ounces) should be added to the butter actually weighed out of that day's milk. The calculation is simple, for if forty-six pounds thirteen ounces of milk produce three pounds fourteen and a half ounces of butter, then two pounds of milk will produce two and two third ounces.

Mr. Thomas Taggart, of Hagerstown, Md., the former owner of Value 2d, by whose test she made twenty-four pounds three ounces in one week with her second calf, was present witnessing the entire test, except the first two milkings.

Other Jersey breeders of the vicinity took great interest in the test, which was in every sense a public one, and were repeatedly present during the operation.

Very respectfully, MASON C. WELD.

As to the feed of Value 2d Mr. Seth writes as follows: "As neither accurate weights nor measures were used, I am unable to say what amount of food was given her. Of grain she had unsifted corn meal, bran, cottonseed meal and linseed meal. She was fed three times a day; morning and evening, corn, bran and cottonseed, and at noon a small quantity of linseed meal was substituted in the place of the cottonseed. On three nights, after the last milking, she had a small quantity of oatmeal gruel, made of half a pound of dry meal. Her green food consisted of cut clover and orchard grass mixed, and oats and peas mixed on alternate days; besides, she had the run in the morning of about one acre of old pasture that had been completely grazed off this season; in the afternoon and night she was put in another lot of about one acre, mostly wood, with a little orchard grass outside of the wood, on which three cows, herself included, had been running for three weeks. These runs were given her for air, shade and water; of pasturage, strictly speaking, I have none, as I soil my cattle entirely. And for the whole period she was fed with reference to the preservation of good health, hoping for as good a yield as consistent therewith."

COPY OF AFFIDAVIT.

STATE OF PENNSYLVANIA, } *to wit:*
PHILADELPHIA COUNTY, }

I hereby certify that on this sixth day of November, A.D. 1883, before the subscriber, a notary public for the State of Pennsylvania, personally appeared William Daly, and being first duly sworn, deposes and says as follows—that is to say:

"I was for about seven months herdsman for Mr. T. Alexander Seth, of Baltimore, Md.; that I had charge of his cow Value 2d during the time she was publicly tested for butter by Colonel M. C. Weld, of New York, and Messrs. Fulford and West, of Maryland. During the week of this test—*i. e.*, from June 19th to 25th, inclusive—I

had sole and entire charge of said cow, and gave her all the food she consumed except pasture; that during said week, and for several weeks before, her grain feed did not exceed twelve pints wheat bran, nine pints corn chop, two pints cottonseed meal, and half a pint of pure linseed meal per day; that she was fed no milk or cream at this or any other time, and had no drink but water; that at no time, while I was at Mr. Seth's place, was Value 2d, or any other cow, fed either milk or cream in any form.

WILLIAM DALY.

Sworn and subscribed to before me, this sixth day of November, A.D. 1883. } R. T. FRALEY, Notary Public.

Chemical test of a sample of the last day's churning of Value 2d's test, by H. W. Wiley, Chemist of the Agricultural Department, Washington, D. C.:

Water	9.98 per cent.
Salt	1.64 " "
Casein	.66 " "
The dry butter fat contained filtered:	
Soluble fat acid	6.79 per cent.
Insoluble fat acid	86.70 " "
Glycerine, etc	6.51 " "
Sum	100.00 per cent.

Melting-point of dry butter fat, 35° C., 75° F.

Melting-point of insoluble acid, 43° C., about 100° F.

Mr. Wiley writes: "I have been much interested in this butter, which, as you see by the analysis, is first-class in every respect. I think you have reason to be proud of the quality of the butter made by your cow, as well as of its quantity. Commercial butters, as far as we have examined them here, have from twelve to fifteen per cent. water, and about eight per cent. casein. The average melting-point is not far from 33° C. The average soluble fat acids is about five per cent. The points of excellence in your butter are its high melting-point, making it firm in hot weather, its low per cent. of curd and its large per cent. of soluble fat acid."

Landseer's Fancy 2876.

At the request of Mr. William J. Webster, Columbia, Tenn., for an official test, Mr. M. C. Campbell was authorized by the Directors of the Jersey Cattle Club to superintend the test which was made December 14th to 20th, 1883.

The weather during the week was "cold, rainy and sleeting." The cow was ten years old, and four months from calving.

TABULAR REPORT.

Date—1883.	Milk.		Date when Churned.	Butter.			
				Unsalted.		Salted.	
	lbs.	oz.		lbs.	oz.	lbs.	oz.
December 14	18	2	Dec. 17	3	12½	3	12
" 15	18	6	" 18	3	8	3	3
" 16	17	2	" 19	3	2	3	½
" 17	17	15	" 21	6		6	½
" 18	17	8					
" 19	17	7	" 22	2	15	2	14
" 20	17	2	" 24	3	2	3	1
Total	123	10		22	7½	21	15

(Signed) M. C. Campbell.

The cow was fed five quarts twice a day of corn and oats ground together, over a peck of oats cut from bundles, and had access to a straw-stack. There was very little milk remaining after skimming, and on the last day the entire milk was churned.

1884.

Naiad of St. Lambert 12,965.

John I. Holly, Esq., *President American Jersey Cattle Club :*

Dear Sir : The undersigned, at your request, as a Committee for the American Jersey Cattle Club, visited "Oaklands," the farm of Valancey E. Fuller, Esq., at Hamilton, Ont., for the purpose of inspecting the test for butter of the cow Naiad of St. Lambert.

The results of the milkings and churnings, with the times at which they were done, the character of the weather, its temperature at noon, the temperature of the cow, and the especial witnesses, are presented in tabular form.

The test was conducted by the manager of the farm and herd, Mr. William T. Norton, who had the entire management of the test, under the guidance of the proprietor, who was personally present every day at one milking, as well as at the drawing off of the cream, and at the first churning.

The test commenced at 6 p.m. on Thursday, the 5th of June, at which time the

cow was milked as usual, and proved to be stripped dry by Mr. Weld, at exactly 6:10. After that she was milked at 6 o'clock, morning and evening, for several days, the last strippings being taken at 6:10 P.M. on Thursday, June 12th.

The milk was weighed as soon as drawn, on a spring balance hanging in the stable, and used for weighing the milk of other cows. This balance was tested and found reasonably accurate. The milk was taken at once to the dairy, where it was strained into one of the cans of a four-can Cooley Creamer in ice-water. The creamer was locked and sealed at once, being banded with tape after locking, and was perfectly secure.

The cream was removed once a day, at evening, after the second day, the milk having been set twenty-four and thirty-six hours.

It was placed in another creamer containing two cans, and kept at the ordinary temperature of the atmosphere. This creamer was also securely locked, banded with tape, and sealed.

The milk before setting, when the locks were off, as well as during skimming and churning the milk, cream and butter, and all the operations, were constantly under the inspection of one or the other, and usually both of us.

New locks were purchased, and a seal used bearing the initials of the Club.

The butter from the first churning, when removed from the churn, was very firm and cold, and, though it appeared to be well worked and dry, really contained too much water and buttermilk, as shown by the slight gain from salting and reworking.

The butter from the second churning was not so cold, gained more weight in salting, and is of better quality. We submit samples of both.

The salt added was an ounce to the pound.

The table scales used for weighing the butter were tested by a pound weight, purchased as a standard, and having the Canadian official seal in lead upon it.

Naiad was fed by Mr. Norton at his discretion. She was kept with the herd, both in the stable and at pasture, but brought in to be fed.

The pasture was, part of the day, a field of heavy red clover, with timothy and other grasses, the clover just coming into bloom at the end of the test, and part of each day and at night the cows were turned into a large lot which had been several years in grass, and from which the clover had nearly disappeared or was no longer conspicuous, but in which a variety of grasses, with the white clover, afforded abundant feed for twice as many cows.

During the last three days of the test we arranged to have a quantity of each kind of meal weighed, and from these weighed quantities Mr. Norton used as much as he pleased, the bags being weighed at evening.

This gave us accurately the amount of grain-feed consumed daily during this part of the test, when the cow was no doubt fed more than before. The various

quantities of each kind of feed given daily for the fifth, sixth and seventh days of the test are submitted in tabular form herewith.

The weather for the first three days was fair, but hot and sultry, while that of the rest of the week was foggy, rainy, and cold for the season. The change seemed favorable for the production of milk, but the butter product seems not to have been affected, either by the increase of feed or by the change in the weather.

The last day there were intimations that Naiad was coming in heat, and on the following day at the morning milking her milk fell off to about ten pounds.

(Signed) M. C. WELD.
NEW YORK, June 19, 1884. HENRY E. ALVORD.

Naiad of St. Lambert 12,965, solid gray, shading to fawn, bred by Romeo H. Stephens, is a finely formed cow, below medium size, four years old in January, and weighs about seven hundred and fifty pounds. M. C. W.

TABULAR REPORT.

DATE.	Weather.	Temperature.		Milk.			Churning.	Butter.		Witnesses.
		Air.	Cow.	6 A.M.	6 P.M.	Total.		Unsalted.	Salted.	
		M.	P.M.					lbs. oz.	lbs. oz.	
June 5....	Fair.	...	..	....	dry.	....	June 11 and 14 cream			M. C. Weld.
" 6 ..	"	86°	......	17¼	21	38¼	from milk of first			Weld and H. E. Alvord.
" 7....	"	78°	102.5°	16¼	18	34¼	half of week, 127			Weld and Alvord.
" 8....	"	86°	102.2°	18½	19½	38	lbs., yielded........	10 12	10 14½	Weld and Alvord.
" 9....	Showers.	83°	102°	16½	18½	35				Weld and Alvord.
" 10....	Cold rain.	56°	100°	20½	17½	38	Cream from milk of			Weld and Alvord.
" 11....	Cold fog.	58°	101°	21½	22	43½	last half of week,			Weld and Alvord.
" 12....	Very foggy.	68°	102.2°	20	20	40	140 lbs., yielded....	10 11½	11 4	Weld and H. H. Fuller.
Seven days (average $38^1/_7$ lbs. a day)..........						267		21 7½	22 2¼	

GRAIN FEED LAST THREE DAYS OF TEST.

	Tuesday, June 10. lbs.	Wednesday, June 11. lbs.	Thursday, June 12. lbs.
Oats, crushed..........................	21	21	22½
Linseed Cake Meal....................	10	9	8½
Pea Meal..............................	11¼	8½	15½
Wheat Bran............................	5	5	5
Total..............................	47¼	43½	51½

M. C. WELD.
HENRY E. ALVORD, per W.

Percie 14,937.

REPORT OF OFFICIAL TEST.

Percie 14,937, aged three years, owned by C. Wellington, East Lexington, Mass. Sire, Golden Lion 5239. Dam, Bellita 2d 10,311. Last calf dropped May 22d, 1884. Cow not served at time of test. Estimated weight, 800 pounds.

Date.	Milkings at 5:30 A.M.		Milkings at 12:30 P.M.		Milkings at 7 P.M.		Daily Total.		Weekly Total.		Cream.		Butter.	
	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.
17th	15	15	11	8	10	3	37	10						
18th	14	9	12	12	9	3	36	8	74	2	27	15	5	15½
19th	14	11	12	15	9	12	37	6	111	8				
20th	14	2	13	15	9	8	37	9	149	1				
21st	14	12	13	5	10	6	38	7	187	8	27	2	6	1
22d	15	3	11	1	10		36	4	223	12				
23d	14	5	11	8	11	11	37	8	361	4	9	6	2	6

Total yield of butter for seven days, ready for market, fourteen pounds six and one half ounces.

Test began June 17th and ended on the 23d. Feed, daily ration, two quarts corn meal, three quarts fine feed, one quart linseed meal, and pasture.

"I was told by owner and by dairy-woman that this cow had made sixteen pounds and over of butter the preceding weeks since calving. It will be noticed that the last day's yield bears out that statement, which leads me to consider the result of the test as not representing her full capacity.

"I was present at each milking, and have had at all times exclusive control of milk and cream."

(Signed) ORESTES PIERCE.

A true copy. Attest. WILLIAM SULLIVAN, J. P.

COMMONWEALTH OF MASSACHUSETTS, SUFFOLK COUNTY, *ss.:*

There personally appeared before me, this twenty-sixth day of June, A.D. 1884, Orestes Pierce, of Baldwin, Me., and made oath that he is the duly appointed agent of the American Jersey Cattle Club for the purpose of testing the Jersey cow Percie 14,937; that he has tested the said cow, and that the foregoing statement contains a true statement of the result.

(Signed) WILLIAM SULLIVAN, J. P.

Mermaid of St. Lambert 9771.

NEW YORK, July 11, 1884.

MR. JOHN I. HOLLY, *President American Jersey Cattle Club:*

DEAR SIR: As the committee appointed by you to witness the test of Jersey cow Mermaid of St. Lambert 9771, owned by Mr. Valancey E. Fuller, of Oakland Farm, Hamilton, Ontario, Canada, I beg to report that the test was commenced June 25th, by my seeing that at 6 P.M. of that day she was milked entirely dry. The first milking which was saved for test was made on the morning of the 26th, at 6 o'clock. From that time until July 2d, at 6 P.M., inclusive, I saw the said cow milked twice each day, at regular hours, making in the aggregate fourteen milkings. The product of said milkings was under my personal supervision from the moment it left the cow's udder until securely locked in a Cooley Creamer, taped and sealed by me with private seals and locks, as was the case with each and every milking separately.

The milk was allowed to remain in the creamer thirty-six (36) hours, after which the cream was removed and put into another creamer, which was locked and sealed by me. At no time was the milk or creamer disturbed, except in my presence, after the seals and locks were removed by me. There were two churnings made of the cream, from seven (7) milkings each. The first churning produced twelve (12) pounds five and one fourth (5¼) ounces unsalted, thoroughly worked butter; the second, twelve (12) pounds five and one half (5½) ounces of same, making in the aggregate twenty-four (24) pounds, ten and three quarter (10¾) ounces unsalted butter in the seven days. To this was added salt at the rate of one (1) ounce to the pound when reworked.

The butter was reweighed and produced twenty-five (25) pounds thirteen and a half (13½) ounces of butter ready for market.

Mermaid of St. Lambert 9771 was dropped April 27th, 1879; dropped last calf April 20th, 1884, and was unserved when tested.

The feeding was under the control of the owner, and only such observations were made by me as convenience permitted. I was informed, however, that she received the following food, in which statement I have full confidence:

At beginning of test four quarts of crushed oats, one quart linseed meal, one quart pea meal, two quarts wheat bran.

Fed four times daily, and on the third day the feed was increased gradually up to six quarts crushed oats, one quart linseed meal, one quart pea meal—bran omitted.

From this on she was fed five times a day, excepting one day, when she was fed six times.

The cow was kept with a part of the herd at pasture, but brought in to be fed.

The accompanying table will give you the details of each stage of the test, and, as it sufficiently explains itself, I herewith submit it as part of my report:

Date.	Weather.	Thermometer at 6 A.M.	Milk. 6 A.M.	Milk. 6 P.M.	Total.	Churning July 2d and 5th.	Butter. Unsalted.		Butter. Salted.	
			lbs.	lbs.	lbs.		lbs.	oz.	lbs.	oz.
June 25...	Cold Rain.			Dry.		Cream from Milk				
" 26...	Fair......	62°	24½	19½	44	of first 3½ days,				
" 27...	"	70°	20	21	41	151 lbs. yielded.	12	5¼	12	13¼
" 28...	"	72°	20	23	43					
" 29...	"	74°	23	22	45	Cream from Milk				
" 30...	"	75°	23	23	46	of last 3½ days,				
July 1....	Showers..	74°	23	21	44	156 lbs. yielded.	12	5½	13	00¼
" 2....	Cloudy....	73°	20½	23½	44					
Seven days (average 43⁶⁄₇ lbs. a day)......					307		24	10¾	25	13½

(Signed) W. F. Williams.

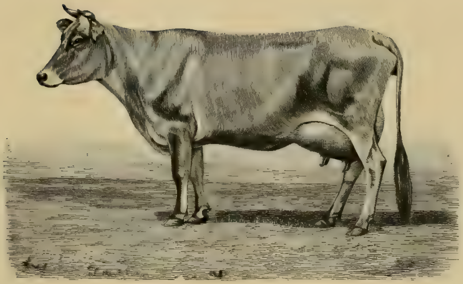
Niobe of St. Lambert 12,969.

Officially tested July 14th to 21st, by a committee consisting of Messrs. Thomas Stock and J. Henry Gest. Niobe of St. Lambert, belonging to Mr. V. E. Fuller, Hamilton, Canada, was a few days past four years old at time of test, and had dropped her calf May 11th, two months previous to test.

The cow was with the herd at pasture and in the stable, and fed by Mr. William T. Norton. The pasture was a field of clover very much dried, and supplemented by a feed of green corn-fodder night and morning. The grain feed, as reported to us by Mr. Norton, was from eighteen to twenty-six quarts daily, the highest being thirteen quarts of ground oats, four of wheat bran, four and one half of pea meal, and four and one half of linseed meal.

During the seven days she gave two hundred and eighty pounds twelve ounces of milk, from which was made butter weighing twenty pounds twelve and a half ounces unsalted, and twenty-one pounds nine and a quarter ounces salted and ready for market.

J. Henry Gest.
Thomas Stock.



MERMAID OF ST. LAMBERT 9771.

AT 5 YEARS OLD.

Stoke Pogis—Marjoram Type.

OAKLANDS HERD.

VALANCEY E. FULLER, HAMILTON, ONTARIO, CANADA.

Gilt Edge C. 12,223.

To the Directors of the American Jersey Cattle Club :

DATE.	Milk.	Butter.	
	lbs.	lbs.	oz.
July 21	$38\frac{1}{4}$	2	$8\frac{1}{2}$
" 22	$35\frac{1}{4}$	2	
" 23	37	2	2
" 24	$36\frac{1}{2}$	2	$2\frac{1}{2}$
" 25	34	1	$13\frac{1}{2}$
" 26	35	2	1
" 27	$31\frac{3}{4}$	1	8
	$247\frac{3}{4}$	14	$3\frac{1}{2}$

This was well-worked, unsalted butter.

The above test was made under the supervision of the undersigned, one or the other being present at each and every milking, skimming and churning, and all under seal except in the presence of one or the other, and sometimes both. She came in heat on the 22d, and her udder was hurt—supposed to be snagged—which caused pain and trouble in milking, preventing thereby a fair test.

MAT. MAHORNER,
A. W. LAMPKIN, } *Committee.*

Rioter Pink of Berlin 23,665.

Officially tested from August 9th to 15th by N. G. Pond.

She was at time of test four years two months old; three months eight days after calving.

Her yield for the week was nineteen pounds well-washed and worked butter, which when salted one ounce to the pound and reworked weighed nineteen pounds fourteen ounces. The grain rations were in quarts: 9th, pea meal, 3; corn meal, 1; oil meal, 1; oats, ground, 6; bran, coarse, 4; total, 15. 10th, pea, $4\frac{1}{2}$; oil, $1\frac{1}{2}$; oats, 8; bran, 4; total, 18. 11th, pea, 5; oil, 5; oats, 8; bran, $7\frac{1}{2}$; total, $25\frac{1}{2}$. 12th, pea, $5\frac{1}{2}$; oil, 2; oats, $12\frac{1}{2}$; bran, 5; total, 25. 13th, pea, 4; oil, 1; oats, 12; bran, 3; total, 20. 14th, pea, 5; oats, 15; bran, 4; total, 24. 15th, pea, 3; oats, 9; bran, 3;

total, 15. Total for 7 days, 142½. Total cost at Berlin, $2.58. The feeding was left to the judgment of the herdsman, James Harlock. The cow was at the town residence of the owner, and was under the disadvantage of a shadeless pasture (nearly a mile from the barn, over a stony, hilly road) during the heat of the day, which on the last half of the test was excessive, and yarded during the night fully fourteen hours—conditions that should have been reversed—and on the evening of the tenth (10th) and during the eleventh (11th) was in heat.

Rioter Pink is a large, evenly developed cow, weighing nine hundred and fifty pounds, with a wide rear udder, running well forward, milking in eight minutes. She is full sister to Mermaid of St. Lambert, therefore fifty per cent. Stoke Pogis 3d, and twelve and a half per cent. Victor Hugo 197, one cross through Buffer 2055, grandsire of Mary Anne of St. Lambert. Her blood, in common with Mary Anne, is ninety-eight and three quarters per cent.

(Signed) N. G. Pond.

RULES FOR TESTING JERSEY COWS.

Amendments to By-Laws of the American Jersey Cattle Club, passed by the Board of Directors, August 13th, 1884, and submitted to the Club for approval, confirmed by a large majority of the members.

Article VI.

1. A book shall be kept by the Secretary, to be known as "The Official Butter Test Book," in which all tests heretofore made by an appointee of the Club, or which shall hereafter be made by the Club, shall be entered.

2. The Executive Committee of the Board of Directors shall, as soon as possible, appoint testers for each State, Territory or province, to conduct tests on behalf of the Club, who may be removed at any time by a majority of the Board of Directors.

3. Any person making application for a test by the Club shall bear all the cost thereof, which must be fully paid before the same is entered in "The Official Butter Test Book," or reported; upon application a deposit of $50 shall be made to apply toward cost of the test and the publication of the result of the same.

4. Upon such application with such deposit the President of the Club shall appoint a committee from among the approved testers, to be appointed under Section 2, or any member of the Club, or any expert (whether resident in the State, Territory or province, or not), at his option.

5. Such committee shall be paid by the Club $5 per day for each day he is necessarily engaged in conducting such test, as also his travelling expenses to and from the place where the test is to be conducted.

6. Under no circumstances shall any payment or gratuity to the tester be made or permitted from or by the owner of the cow, or any one interested in her, and any violation hereof shall invalidate the test.

7. The following rules shall be followed in every test:

(*a*) The committee shall see the cow completely milked out twelve hours before the next succeeding milking.

(*b*) The committee shall be present at each milking throughout the entire test, and must see the milk weighed, and keep accurate records of the net weight of each milking and time of milking.

(*c*) Immediately upon the milk being weighed the committee must see the milk placed under lock and seal. In case a creamer is used, the committee must securely lock the creamer containing the milk with a padlock, to be provided by such committee, and must seal the same by passing a ribbon or band of tape around the creamer, and sealing such tape or band with a seal not furnished by the owner. In case the milk is set in pans or crocks, the room in which it is set must be securely locked by the committee, and the doors and windows thereto sealed.

(*d*) The committee must be present at the drawing off of the cream, and must retain it securely with the same precautions as are set out in last preceding section.

(*e*) When the owner of the cow considers the cream or whole milk ripe for churning the committee must see the cream or whole milk placed in the churn and remain until it is churned, thoroughly worked, salted, reworked and reweighed; he shall weigh the butter before salting, and after being salted and reworked. In salting, one ounce of salt to every pound of butter shall be used, the tester keeping a record, and reporting to the Club the temperature at which the cream or whole milk was churned, and length of time required in churning. The quantity of butter with which the cows shall be credited shall be salted butter ready for market.

(*f*) The committee shall report, as nearly as possible, the quantity in weight and composition of the food given the cow during her test, but the feeding of the cow and the quantity of feed given shall be left to the judgment of the owner.

(*g*) Two milkings only per day shall be made, unless the cow is incommoded thereby.

8. The report of the committee shall be retained by the Club as a permanent record, and the quantity of butter made by such cow shall be entered in the "Official Butter Test Book." No test shall be made for a shorter period than seven consecutive days.

9. In the issue of any herd register hereafter to be published by the Club, in case the dam is reported in the "Official Test Book," her butter record in pounds and ounces shall be added after her herd-book number, or in a foot-note wherever her name appears.

Ida of St. Lambert 24,990.

PERTH AMBOY, N. J., September 23, 1884.

JOHN I. HOLLY, *President:*

MY DEAR SIR: Responding to your request, I started on the 10th inst. for "Oaklands," to supervise the testing of the Jersey cow Ida of St. Lambert No. 24,990. By the accompanying report you will see that she made the unprecedented amount of thirty pounds two and a half ounces of salted butter in seven days. Neither the milk, cream or butter were out of my sight for one moment, from the beginning to the end of the test, unless under lock and sealed with my seal; and during the test the feeding was left entirely to the discretion of the manager of the "Oaklands Herd." The cow Ida is a good feeder, and whatever the manager thought tempting he fed her—mangolds, cabbage, carrots, corn fodder; and for pasture she had an almost burnt-up second-growth clover. Besides the foregoing she was fed as high as forty-five imperial quarts of mixed grains per day, and from that down to twenty-six quarts per day, the amount being increased or diminished at discretion of the manager.

The mixed grains were in the following proportions: Crushed oats, four quarts; ground oil cake, one quart; wheat bran, two quarts; and pea meal, two quarts. She was fed as often during the day as the manager thought prudent, and the various ingredients were also varied as he thought fit.

In this test the whole milk was first cooled, and then left to ripen, meanwhile being daily stirred; when thought ripe enough it was put into a barrel churn.

The first three and a half days' milk was put in at a temperature of 62° and the churn started at 7.05 P.M.; at 8.37 P.M. the butter separated, and a part of the buttermilk was drawn off and the churn again started slowly; by 9.23 P.M. the butter had gathered in a great mass, and the buttermilk was drawn off; cold water was then poured on the mass, and the churn given quarter-revolutions backward and forward. In this way the lump was washed in three waters, the lump breaking into two pieces before the third washing. The butter was then taken out and weighed and salted, one ounce to the pound, and then weighed as salted butter. The entire time from the putting of the milk into the churn until the mass was weighed as unsalted butter was two hours and thirty minutes, and from the time it was weighed as unsalted butter until reweighed as salted butter was less than five minutes.

The second churning was conducted in the same manner, excepting that the milk was reduced from 68° to 62° by the addition of ice-water. This churning separated in one hour and seven minutes, and it gathered in five or six lumps in thirteen minutes more.

The buttermilk was then drawn off and the process of washing repeated with two waters, then weighed, salted and reweighed.

The rules for official testing of cows, as proposed to the Club for adoption, were strictly adhered to in this test, and every precaution taken in the way of locks, tapes, seals, etc. The milk of the 12th, 13th and 14th, and morning of the 15th was churned on the 18th, at 7 P.M., and made fourteen pounds salted. The milk of the eve of the 15th and of the 16th, 17th and 18th was churned on the 21st, at 10 A.M., and made sixteen pounds two and one half ounces salted, or a grand total of thirty pounds two and one half ounces for the week.

Very truly yours, D. W. WATROUS.

DESCRIPTION OF **Ida of St. Lambert 24,990.**

Solid light cream fawn, full black points; upturned horns, black, mottled with white.

Sire, Stoke Pogis 3d 2238; dam, Kathleen of St. Lambert 5122. Last calf dropped in June, 1884. Not in calf when tested.

DATE.	Milking Time.	Milk.		Temperature.	Total 3½ days' Milk.	Unsalted Butter.		Salted Butter.		Total Weekly Yield.	
		lbs.	oz.	deg.	lbs.	lbs.	oz.	lbs.	oz.	lbs.	oz.
Friday, Sept. 12, '84....	6.30 A.M.	20	0	48							
	6.30 P.M.	22	8	60							
Saturday, Sept. 13, '84 ..	6.30 A.M.	20	8	44							
	6.30 P.M.	22	8	64							
Sunday, Sept. 14, '84....	6.30 A.M.	21	8	42							
	6.30 P.M.	21	8	60							
Monday, Sept. 15, '84 ...	6.30 A.M.	20	0	48	148½	13	4¾	14			
	6.30 P.M.	20	8	70							
Tuesday, Sept. 16, '84...	6.30 A.M.	22	0	72							
	6.30 P.M.	22	8	70							
Wednesday, Sept. 17, '84	6.30 A.M.	21	8	58							
	6.30 P.M.	19	0	62							
Thursday, Sept. 18, '84..	6.30 A.M.	16	8	55						official,	
	6.30 P.M.	20	0	58	142	15	6¼	16	2½	30	2½
Totals.............		290	8		290½	28	11	30	2½		

PERTH AMBOY, N. J., September 23, 1884. D. W. WATROUS.

Mary Anne of St. Lambert 9770.

HAMILTON, October 2, 1884.

JOHN I. HOLLY, ESQ., *President American Jersey Cattle Club, Nos.* 1 *and* 3 *Broadway, New York, N. Y., U. S.:*

DEAR SIR: Having been appointed by you as a committee to witness the test of the Jersey cow Mary Anne of St. Lambert 9770, owned by Mr. Fuller, of "Oaklands Farm," Hamilton, Ontario, we beg to report as follows: The test began September 23d, by Walter Rutherford seeing that at 6:30 of that day the cow was milked dry. The first milking for the test was made at 6:30 P.M. of the same day, in the presence of Walter Rutherford, and the cow was milked at 6:30 A.M. and 6:30 P.M. each day up to and including morning of the 30th ultimo. The cow was, at the dates and times named, milked in the presence of Walter Rutherford each time, and in the presence of Thomas Stock on the following dates: The evening of the 24th, both milkings of the 25th, both milkings of the 26th, both milkings of the 27th, and both milkings of the 29th. The milk produced by the cow at each milking—namely, fourteen—was, from the moment it left the cow's udder until securely locked in a Cooley creamer, under the personal supervision of each of the committee, when present, and always under the personal supervision and within the sight of Walter Rutherford (I, Walter Rutherford, always following close to the pail when taken from the stable to the Cooley creamer) until securely locked in a Cooley creamer, which was fastened with a tape passed round the creamer and through the hasp of the padlock, and sealed by Walter Rutherford with a private seal, and locked by Walter Rutherford with new padlocks purchased by the committee for this test. The milk remained in the creamer for thirty-six hours, and the whole milk was then removed and put in another creamer, which was locked and sealed in the same way as the Cooley creamer, in the presence of both the committee, when both were present, but always in the presence of and by Walter Rutherford. The seal used for this creamer was the same private seal, and the padlock was a new padlock purchased by the committee for the express purpose.

Before any fresh milk was put into the creamer, or before any whole milk was removed from it, I, Walter Rutherford, always examined the seals and found them perfect and untampered with. The same care was taken to see that the seals of the creamer in which the whole milk was left to ripen had been untampered with, and we found the seals throughout the test perfect. The milk or cream was never disturbed except in the presence of both of us, when both were present (and always in the presence of Walter Rutherford), and until after the seals and locks had been removed by Walter Rutherford.

On the evening of the 28th, after the night's milking had been brought

over from the stable, in the presence of me, Walter Rutherford, I, Walter Rutherford, had the milk poured into the creamer between me and the lamp we were using, and to me the whole milk when hot and fresh from the cow had the appearance of cream. Two churnings of the whole milk were made, each churning being of seven milkings.

Before each churning the seals were examined and broken, by Walter Rutherford, of the creamer in which it was put to ripen, the padlocks were opened in the presence of both the committee by Walter Rutherford, the whole milk was placed in the churn in the presence of both of the committee at each churning, and both of the committee were present throughout the entire churning. From the time that the milk went into the churn until the butter was gathered of the first churning the time was one hour and a quarter, and it produced seventeen pounds one and a half ounces unsalted, well-worked butter. For the second churning the whole milk was removed in the same way in the presence of both of us, and both of us were present throughout the whole churning, which took one hour and five minutes, producing eighteen pounds seven and a half ounces of well-worked, unsalted butter, the total unsalted butter in seven days being thirty-five pounds eight and three quarter ounces. At each churning salt was added at the rate of one ounce to the pound, in our presence, when the butter was reworked in our presence by the dairy-woman, which we do not think was thoroughly worked, but was worked as much as the dairy-woman believed the butter required for her mode of making. Each churning was reweighed by us after salting and working, the first producing seventeen pounds seven and a half ounces, and the last nineteen pounds four and three quarter ounces, making a total of thirty-six pounds twelve and one quarter ounces of good marketable butter. The butter was of very high color and very good texture. Herewith we send you some of the butter for analysis, and would request you to be good enough to have it analyzed. Mary Anne of St. Lambert 9770 was dropped March 26th, 1879; dropped her last calf July 23d, 1884. She was served for the last time, as we are informed, on August 25th, 1884, and we are informed that she was only served once, and as she has never been in season since it is assumed she is in calf.

The cow was fed by the manager at his discretion, and he informs us that at the beginning of the test she was eating thirty-five imperial quarts of feed per day, consisting of the following: Twenty quarts ground oats, ten quarts pea meal, three quarts ground oil cake, two quarts wheat bran, and that this was increased up to about fifty quarts per day, the composition of the above food being varied.

She was also fed a small quantity of roots and cabbages and a few apples. When we saw her fed she always appeared (excepting once) greedy for her food. This was divided up into from five to seven feeds. The cow was kept with Ida of St. Lambert in a small pasture of withered clover—very poor feed—with no undergrass at all, and

which could not produce a flow of milk, but the whole feed was given to enrich it. Mary Anne is long-bodied, with a wedge-shaped, wide-spread barrel; she is exceedingly deep through the chest, weighing ten hundred and fifty pounds. She is very clean-limbed, very fine head, with horns turning in, a little long in the face, rather straight, very well sprung open ribs; she is very long from hip to rump; she has a very large belly escutcheon; good milk-veins, very large and tortuous, and many udder-veins.

We are informed that ever since the cow got over her calving the cow has been fed rich food, with the intention of producing rich milk rather than a flow, and keeping in mind the test that was before her; and if their statements are correct, she really has been fed for this test for nearly two months, and certainly the color and density of her milk bear out its great richness in butter fat. The scale by which the butter was weighed on each occasion was tested by your committee with a pound weight bearing the Government stamp as being a proper pound weight of sixteen ounces to the pound. We send you the accompanying statement, giving you the details of each stage in the test:

Weather.	Thermometer at 9 A.M.	Date of Milking.	Weight of Milk.		When Churned.	Amount of Butter Unsalted.		Amount of Butter Salted Ready for Market.	
	deg.		lbs.	oz.		lbs.	oz.	lbs.	oz.
Fair.....	55	Sept. 23, 6.30 P.M.	16	8	Churned together on the 29th of September, 1884.	17	1¼	17	7½
Rain....	71	" 24, 6.30 A.M.	17	0					
		" 24, 6.30 P.M.	18	8					
Fair.....	60	" 25, 6.30 A.M.	18	0					
		" 25, 6.30 P.M.	18	0					
Fair.....	57	" 26, 6.30 A.M.	19	0					
		" 26, 6.30 P.M.	16	8					
Rain....	70	" 27, 6.30 A.M.	18	0	Churned together on the 2d of October, 1884.	18	7½	19	4¾
		" 27, 6.30 P.M.	15	8					
Rain....	68	" 28, 6.30 A.M.	18	0					
		" 28, 6.30 P.M.	16	0					
Rain....	67	" 29, 6.30 A.M.	18	0					
		" 29, 6.30 P.M.	16	0					
Rain....	63	" 30, 6.30 A.M.	20	0					
Total in seven days..........			245	0		35	8¾	36	12¼

WALTER RUTHERFORD. THOMAS STOCK.

BUTTER ANALYSES.

The following is the report of W. M. Habirshaw, of New York, Chemist to the New York State Agricultural Society, to whom President Holly, of the American Jersey Cattle Club, submitted samples of the butter of Mary Anne of St. Lambert 9770 and Ida of St. Lambert 24,990, as sent by the respective committees.

Mary Anne of St. Lambert's butter contains equivalent to

	Per cent.
Butter Fat*	83.53
Salt	3.47
Casein	1.12
Water (by diff.)	12.88
Per cent	100.00

Ida of St. Lambert's butter contains equivalent to

	Per cent.
Butter Fat†	80.39
Salt	5.21
Casein	1.20
Water (by diff.)	13.20
Per cent	100.00

1885.

PRINCESS 2d 8046.

JOHN I. HOLLY, *President American Jersey Cattle Club, New York:*

DEAR SIR: Having been appointed by you to act as Committee of the American Jersey Cattle Club in witnessing the test of the Jersey cow Princess 2d 8046, owned by Mrs. S. M. Shoemaker, of Burnside Park, near Baltimore, Md., I respectfully submit the following report:

The test began at 6:05 P.M. Sunday evening, February 22d, when the cow was milked dry in my presence. The first milking included in the test was that at 3 A.M. Monday, February 23d, after which the cow was milked at intervals of eight hours—namely, at 3 A.M., 11 A.M. and 7 P.M. of each day, until the last, Sunday

* Insoluble fatty acids, 85.99; soluble fatty acids and glycerine, 14.01.

† Insoluble fatty acids, 85.51; soluble fatty acids and glycerine, 14.49.

evening, March 1st, when she was milked at 6:05 P.M., to correspond with the time of the preliminary milking. The duration of the test was thus seven days, to the minute.

The cow was milked three times a day, at periods of eight hours, because her udder would not hold the milk she made in twelve hours.

I was present at each of the twenty-one milkings, and did not lose sight of the milk until after it had been placed in a nine-can Moseley Cabinet Creamer. The lid of this creamer, the doors and the ventilators were carefully secured each time by tape and seals firmly affixed to the wood, and each stamped with my private seal.

The cream, on being removed from the creamer, was placed in large buckets in a wooden box made at my suggestion, and this box was likewise sealed and stamped.

These various seals remained intact, except when broken by me to admit the milk of each milking, or to draw off cream.

I was also present when the cream was placed in the churn, remained while it was being churned, and weighed the unsalted butter, the salt to be added (one ounce per pound), and finally the salted butter. The butter was worked to my entire satisfaction, exceedingly dry, as will be seen in the fact that the salt when added made almost a clear gain.

So that, from the time of milking until the salted butter had been finally weighed, the milk, cream and butter were either within my sight or securely sealed in the creamer or box described above.

The scales on which the butter was weighed were bought of Fairbanks & Co. for this special purpose, after having been tested and guaranteed by them to be accurate by United States standard. Inclosed is a letter from Fairbanks & Co. to that effect.

The cow was fed at the discretion of Mr. O. Ricklefsen, manager of the Burnside Park Herd, the daily ration being twenty-two quarts ground oats, fifteen quarts pea meal, two quarts linseed-oil cake, one quart wheat bran; total, forty quarts, besides carrots, beets, and good clover hay.

Her appetite was constantly good; in fact, she seemed always ready to eat more.

The weather during the test was disagreeable, cold and snowy, and interfered somewhat with her daily exercise.

In the following table are given the details of the test, which resulted in a total yield in seven days of two hundred and ninety-nine and a half pounds of milk, from which were churned forty-four pounds one and a half ounces of unsalted butter, which, when salted at the rate of one ounce to the pound, gave forty-six pounds twelve and one half ounces of salted butter ready for market. The great gain by

salting is due to the fact that the unsalted butter was worked so very dry that when the salt was afterward worked in no water or buttermilk appeared in the bowl.

It should have been said above that the butter was twice washed in the churn when in the granular form, removing every trace of buttermilk.

		lbs.		
Feb. 22	6.05 P.M.	Milked dry.		
" 23	3.00 A.M.	$18\frac{1}{4}$	$44\frac{1}{2}$ lbs.	Churned March 2d and 3d. Butter, unsalted, 23 lbs. 14 oz. Salted, 1 oz. to lb., 25 lbs. $5\frac{1}{2}$ oz.
	11.00 A.M.	11		
	7.00 P.M.	$15\frac{1}{4}$		
" 24	3.00 A.M.	$17\frac{1}{2}$	$41\frac{1}{2}$ lbs.	
	11.00 A.M.	$11\frac{3}{4}$		
	7.00 P.M.	$12\frac{1}{4}$		
" 25	3.00 A.M.	$13\frac{1}{2}$	40 lbs.	
	11.00 A.M.	$12\frac{1}{2}$		
	7.00 P.M.	14		
" 26	3.00 A.M.	$16\frac{1}{4}$	$43\frac{3}{4}$ lbs.	
	11.00 A.M.	$12\frac{3}{4}$		
	7.00 P.M.	$14\frac{3}{4}$		
" 27	3.00 A.M.	$16\frac{1}{4}$	$44\frac{1}{4}$ lbs.	Churned March 4th. Butter, unsalted, 20 lbs. $3\frac{1}{2}$ oz. Salted, 21 lbs. 7 oz.
	11.00 A.M.	12		
	7.00 P.M.	16		
" 28	3.00 A.M.	$16\frac{1}{4}$	42 lbs.	
	11.00 A.M.	12		
	7.00 P.M.	16		
March 1	3.20 A.M.	$11\frac{3}{4}$	$43\frac{1}{2}$ lbs.	
	11.00 A.M.	$15\frac{1}{2}$		
	6.05 P.M.	$16\frac{1}{4}$		
Seven days' milk			$299\frac{1}{2}$ lbs.	Butter, unsalted, 44 lbs. $1\frac{1}{2}$ oz. " salted, 46 lbs. $12\frac{1}{2}$ oz.

Princess 2d 8046 was dropped February 22d, 1877, and was therefore exactly eight years old when this test began. She is by Khedive P. S. 103, out of Princess F. S. 1294, being a Coomassie-Welcome cow. She is in color light fawn, with white on belly; white switch, very yellow skin; has a large selvedge escutcheon; a large, perfectly formed and very symmetrical udder, with large teats; large and very prominent tortuous milk-veins. Her weight, Mr. Ricklefsen informs me, is 1125 pounds, and she carries no superfluous flesh, being fine in bone and muscle.

Her last calf was dropped December 31st, 1884, seven and a half weeks before

the beginning of this test, for which she was prepared by six weeks of high feeding, which so enriched her milk that during the test only six and two fifth pounds of milk were required to make a pound of butter.

Respectfully, J. HENRY GESTY.

BALTIMORE, March 2, 1885.

MR. HENRY GEST:

DEAR SIR: We desire to say that the scale and weights sold to Mrs. S. M. Shoemaker for the purpose of weighing butter in the test of Princess 2d were sealed to the United States standard, and are guaranteed perfectly accurate in every particular.

Yours very truly, FAIRBANKS & Co.

J. G. DOON.

Euphonia 6783.

JOHN I. HOLLY, *President American Jersey Cattle Club:*

DEAR SIR: By your invitation, in behalf of the Club, I visited the farm of Hon. Frederick Billings, Woodstock, Vt., to witness the test of the Jersey cow Euphonia 6783.

I report: The cow was milked dry March 22d, 5:50 P.M., at which time the test began. The rules of the Club pertaining to tests were faithfully complied with.

Mr. Aitken, manager of the Billings Herd, attests over his signature that the cow received no previous preparation for the test, but that both before and during the week of trial the same treatment as to care and feed was given as was given all other cows in the herd, and no more.

Preparation and method of feeding grain: corn and cob meal, wheat bran, wheat middlings, oil meal, pea meal, all mixed in equal quantities as to weight, and ten pounds given per day, divided as follows: three and one third pounds on steamed cornstalks at 5 A.M.; three and one third pounds on one peck of beets at 12 M., and three and one third pounds (ground flaxseed and ground oats substituted for corn and cob meal and oil meal) scalded on steamed cornstalks at 5 A.M.; hay as required, constituted daily feed. The 12 M. ration of grain was given her in week of trial, and not previously. She was milked at 6 A.M. and 6 P.M.; watered once a day, at 10 A.M.

Temperature of stable, average, 53° above.

Temperature of weather: Monday, 5½° below; Tuesday, 22° below; Wednesday, 13° above; Saturday, 28° above; Sunday, 20° above.

MILK RECORD.

	lbs.	oz.
Monday	18	15½
"	18	0
Tuesday	19	9
"	18	11½
Wednesday	19	2
"	17	5½
Thursday	19	7
"	17	12
Friday	20	7
"	17	7½
Saturday	20	0
"	16	13
Sunday	20	1
"	17	11
Total	261	6

The milk was placed in open cans and set in water to height of milk. Temperature of water, average, 53°.

Result: Churned March 30th. Temperature of cream, 60°. Time of churning, eight minutes; seven pounds seven and one half ounces unsalted butter; seven pounds thirteen and one half ounces salted, ready for market.

Churned April 1st. Temperature of cream, 65°.

Time of churning, eight minutes; seven pounds seven and one half ounces unsalted butter; eight pounds three ounces salted, ready for market.

Total, sixteen pounds one half ounce.

Cost of all feed, grain, roots and hay, thirty-two cents per day.

Cost of butter, per pound, fourteen cents.

The sire of Euphonia was Gilroy 1653, a cross of Lady Mary (the same Lady Mary whose prepotency is seen in several other cows of this herd) and Rioter strains; dam, imported Eudora 1863, an excellent cow of great constitutional stamina, looking a six-year-old, while just entering her eighteenth year, and has a record of two pounds twelve ounces a day.

I am all the more pleased to report the above result, believing that the interests of the Jersey will be advanced by such practical tests, and, while phenomenal records may now and then appear to prove the possibilities of a cow's production under excessive stimulation, results like the above lie within the reach of all, and are worthy of the consideration of the dairymen of the country.

Respectfully submitted, JOHN O. COUCH.

Oxford Kate 13,646.

Mr. John I. Holly, *President of the American Jersey Cattle Club:*

Dear Sir: In compliance with your request to conduct the test of the Jersey cow Oxford Kate 13,646, owned by Mrs. S. M. Shoemaker, of Burnside Park, Baltimore County, I herewith respectfully submit the following report:

The test began at 4 P.M. April 1st, when the cow was milked dry in my presence.

The first milking included in the test was that at 4 A.M., April 2d, after which the cow was milked at intervals of twelve hours, viz., 4 A.M. and 4 P.M. of each day, the last milking being at 4 P.M. of April 8th, to correspond with the preliminary milking. The duration of the test was thus seven days, to the minute.

I was present at each of the fourteen milkings, and did not lose sight of the milk until after it had been placed in a nine-can Moseley Cabinet Creamer. The lids of this creamer, the doors and the ventilators were carefully secured each time by tape and seals firmly affixed to the wood, and each stamped with my private seal. The cream, upon being removed from the creamer, was placed in a box provided for it, and was then securely stamped and sealed.

These various seals remained intact, except when broken by me to admit the milk of each milking, or to draw off cream.

I was also present when the cream was placed in the churn, remained while it was being churned, and weighed the unsalted butter, the salt to be added (one ounce per pound), and finally the salted butter.

The butter was worked to my entire satisfaction, exceedingly dry, and my wishes in every respect were willingly complied with during the test.

In addition, I can say that from the time of milking until the salted butter had been finally weighed the milk, cream and butter were either within my sight or securely sealed in the creamer or box described above.

The scales used in weighing the butter were bought of Fairbanks & Co., and were the same used in the test of Princess 2d.

The cow was fed at the discretion of Mr. O. Ricklefsen, manager of the Burnside Park Herd, who informs me that her daily ration consisted of twelve quarts of pea meal, sixteen quarts of ground oats, three quarts of linseed-oil cake and four quarts of wheat bran, it being a total of thirty-five quarts, to which was added a plentiful supply of good clover hay, beets and carrots.

In the following table are given the details of the test, which resulted in a total yield in seven days of two hundred and forty-eight and one half pounds of milk, from which were churned thirty-eight pounds two ounces of unsalted butter, which, when salted at the rate of one ounce to the pound, gave thirty-nine pounds twelve ounces (39 lbs. 12 oz.) of salted butter, ready for market.

ONE WEEK'S TEST OF OXFORD KATE.

1885.		
April 1, 4 P.M.	milked dry.	
" 2, 4 A.M.	19½	31¾ lbs.
" 2, 4 P.M.	12¼	
" 3, 4 A.M.	15½	34 lbs.
" 3, 4 P.M.	18½	
" 4, 4 A.M.	17½	34¾ lbs.
" 4, 4 P.M.	17¼	
" 5, 4 A.M.	19½	38½ lbs.
" 5, 4 P.M.	19	
" 6, 4 A.M.	16½	34 lbs.
" 6, 4 P.M.	17½	
" 7, 4 A.M.	19	37 lbs.
" 7, 4 P.M.	18	
" 8, 4 A.M.	22	38½ lbs.
" 8, 4 P.M.	16½	
Total		248½ lbs.

CHURNED APRIL 6.

	Butter.
Unsalted	11 lbs. 1 oz.
Salted	11 " 9 "

CHURNED APRIL 8.

Unsalted	10 lbs. 5 oz.
Salted	10 " 9 "

CHURNED APRIL 10.

Unsalted	16 lbs. 12 oz.
Salted	17 " 10 "

UNSALTED.	SALTED.
11 lbs. 1 oz.	11 lbs. 9 oz.
10 " 5 "	10 " 9 "
16 " 12 "	19 " 10 "
38 lbs. 2 oz.	39 lbs. 12 oz.

Oxford Kate 13,646 was dropped February 20th, 1879, and is consequently a little over six years old. She dropped her last calf on the 9th of January, 1885. Her sire is Pilot 183, Jersey Herd Book (C.). Her dam was Verclut 1846 F. S. (C.), Jersey Herd Brook.

Her color is a light brown; crescent on left flank; brown and white switch; first order flandrine escutcheon, with remarkable width on the thighs; extra large milk-veins; perfect-shaped udder, very deep; short legs, and altogether a perfect type of a Jersey cow.

All of which is respectfully submitted,

ANDREW BANKS.

BALTIMORE COUNTY, April 10, 1885.

Carrie Lena 3d 20,077 and Mary Jane of Bellevue 6956.

NASHVILLE, TENN., June 12, 1885.

THOMAS J. HAND, *Secretary American Jersey Cattle Club, New York:*

DEAR SIR: Having been appointed by the President of the Club to conduct the tests of the cows Mary Jane of Bellevue 6956 and Carrie Lena 3d 20,077,

belonging to Major Campbell Brown, of Spring Hill, Maury County, Tenn., and being unable to personally superintend it, we, upon consultation with other members of the Club, selected Mr. C. O. Nicholson, of Columbia, Maury County, Tenn., to act for us.

We enclose herewith the report made to us by him, which we adopt as our own. We also enclose a statement of his account, which, Major Brown informs us, is in all things correct.

Very respectfully, THOMAS H. MALONE.
M. M. GARDNER.

Carrie Lena 3d 20,077.

NASHVILLE, TENN.

MESSRS. THOMAS H. MALONE *and* M. M. GARDNER:

GENTLEMEN: Having been selected by you to conduct the test of the Jersey cow Carrie Lena 3d 20,077, belonging to Major Campbell Brown, of Spring Hill, Tenn., I hereby submit the following report:

I saw the cow milked dry on the evening of May 20th at 6.30 o'clock, twelve hours previous to the commencement of the test. I afterward saw her milked at 6.30 A.M. and 6.30 P.M. each day, from May 21st to May 27th inclusive. I was present at each of the fourteen milkings, and the milk was not out of my sight until I had weighed and placed it in a Cooley Cabinet Creamer, which I securely locked with a padlock, and also sealed by placing a band of tape around the creamer. I also sealed all of the screws, etc. I saw the cream drawn off, and I placed it in a box under a padlock and seal in the same manner as the creamer. I used my own seal. These various seals remained intact, except when broken by me to admit the milk of each milking or to draw off cream. I was also present when the cream was churned, and weighed the unsalted butter, added the salt (one ounce per pound), and then weighed the salted butter.

The cow was fed twice daily, and Mr. Bruce, the herdsman, informed me that the daily ration was two pounds of ground oats, two pounds wheat bran, and eight pounds corn-hearts, a total of twelve pounds daily. He gave her some pea meal once during test, but she would not eat it. She ran on a good blue-grass pasture with the herd.

The butter was thoroughly worked to my satisfaction, and was good first-class butter.

In the following table are given the details of the test:

	lbs.	oz.	lbs.	oz.		lbs.	oz.	
May 21, 6.30 A.M.,	15	6	30	0				
" 21, 6.30 P.M.,	14	10			Churned May 25.			Temperature, 68°.
" 22, 6.30 A.M.,	14	8	30	0	Unsalted butter,	6	9½	Time, 15 minutes.
" 22, 6.30 P.M.,	15	8			Salted "	7	0	
" 23, 6.30 A.M.,	14	10	28	10				
" 23, 6.30 P.M.,	14	0						
" 24, 6.30 A.M.,	13	0	26	0	Churned May 28.			Temperature, 69°.
" 24, 6.30 P.M.,	13	0			Unsalted butter,	4	2½	Time, 10 minutes.
" 25, 6.30 A.M.,	13	10	26	2	Salted "	4	6	
" 25, 6.30 P.M.,	12	8						
" 26, 6.30 A.M.,	14	8	28	12	Churned May 29.			Temperature, 68°.
" 26, 6.30 P.M.,	14	4			Unsalted butter,	4	10	Time, 15 minutes.
" 27, 6.30 A.M.,	14	8	27	8	Salted "	4	14	
" 27, 6.30 P.M.,	13	0						
Total milk for seven days..			197	0	Unsalted butter,	15	6	
					Salted "	16	4	

I would state that all the rules laid down by the Club were strictly carried out in every particular.

Carrie Lena 3d 20,077 was dropped March 14th, 1883. She dropped her last calf January 10th, 1885. Her sire is Lenox Cash Boy 6804, her dam Carrie Lena 3348. Her weight is six hundred and sixty pounds.

All of which is respectfully submitted.

C. O. NICHOLSON.

May 29, 1886.

Mary Jane of Bellevue 6956.

MESSRS. T. H. MALONE *and* M. M. GARDNER, *Nashville, Tenn.:*

GENTLEMEN: Having been selected by you to conduct the test of the Jersey cow Mary Jane of Bellevue 6956, the property of Major Campbell Brown, of Spring Hill, Maury County, Tenn., I hereby submit the following report:

I saw her milked out clean on the evening of May 20th, at 6.30 o'clock, twelve hours before commencing the test. I afterward saw her milked at 6.30 A.M. and 6.30 P.M. each day from May 21st to May 27th inclusive. I was present at each of the fourteen milkings, and the milk was not out of my presence until I had weighed it and placed it in a Cooley Cabinet Creamer, which I securely locked with a padlock,

and also sealed by placing a band of tape around the creamer. I also sealed all of the screws, etc.

The seal used was my own.

I saw the cream drawn off and placed in a box under a padlock and seal in the same manner as the creamer. These various seals remained intact, except when broken by me to admit the milk of each milking, or to draw off the cream. I was also present when the cream was churned, and weighed the unsalted butter; the salt was added (one ounce to the pound), and finally I weighed the salted butter.

The butter was worked to my satisfaction.

In the following table are given the details of the test:

	lbs.	oz.	lbs.	oz.		lbs.	oz.	
May 21, 6.30 A.M.,	16	0	33	4				
" 21, 6.30 P.M.,	17	4			Churned May 25.			Time, 16 minutes.
" 22, 6.30 A.M.,	18	4	32	4	Unsalted butter,	6	0	Temperature, 68°.
" 22, 6.30 P.M.,	14	0			Salted "	6	3	
" 23, 6.30 A.M.,	19	8	35	0				
" 23, 6.30 P.M.,	15	8						
" 24, 6.30 A.M.,	20	8	36	0	Churned May 28.			Time, 15 minutes.
" 24, 6.30 P.M.,	15	8			Unsalted butter,	4	3½	Temperature, 68°.
" 25, 6.30 A.M.,	18	0	34	0	Salted "	4	6	
" 25, 6.30 P.M.,	16	0						
" 26, 6.30 A.M.,	19	0	33	8	Churned May 29.			Time, 15 minutes.
" 26, 6.30 P.M.,	14	8			Unsalted butter,	4	6½	Temperature, 68°.
" 27, 6.30 A.M.,	20	0	34	10	Salted "	4	9	
" 27, 6.30 P.M.,	14	10						
Total milk for seven days..	238	10			Unsalted butter,	14	10	
					Salted "	15	2	

The cow was fed twice daily, and Mr. L. P. Brown, who fed her, informs me that her daily ration was: Ground oats, 11 lbs.; bean meal, 5 lbs.; pea meal, 2 lbs.; cottonseed meal, 2 lbs.; cornhearts, 1 lb.; total, 21 lbs. daily. She ran on a good blue-grass pasture with the rest of the herd. I would state that all the rules laid down by the Club were fully carried out in every particular. Mary Jane of Bellevue was dropped in the spring of 1876. She dropped her last calf March 30th, 1885. Her sire was Remarkable, F. 229 J. H. B., her dam Nelly, F. 1509 J. H. B. I would further state that her butter was of very fine quality.

All of which is respectfully submitted. C. O. Nicholson.

May 29, 1885.

Mamelle 20,804 and Tette 20,802.

NASHVILLE, TENN., June 20, 1885.

MR. F. BRONSON, *President American Jersey Cattle Club :*

DEAR SIR : Having been appointed by you to act as a committee of the American Jersey Cattle Club in witnessing the test of the Jersey cows Mamelle 20,804 and Tette 20,802, owned by Mr. Thomas H. Malone, of Nashville, Tenn., I respectfully submit the following report :

TEST OF MAMELLE 20,804.

I associated with myself Mr. George H. Harding, of this county, a gentleman of well-known integrity and reliability.

Mamelle was milked clean in our presence Friday, June 5th, at 6 A.M., giving seventeen pounds ten ounces of milk.

The first milking included in our test was Friday, 6 P.M., June 5th. She was milked twice a day, morning and evening, at 6 A.M. and 6 P.M., during the test.

We were present at each of the fourteen milkings, and did not lose sight of the milk until after it had been placed in a four-can Cooley creamer.

The lids of this creamer were securely locked by locks of our own. A tape was then passed around the creamer and through the locks, and seals firmly affixed to the wood, on the tape, and each stamped with our private seals.

The cream on being removed from the creamer was placed in tin cans, which were put in a large wooden box made for the purpose. This box was locked with our lock, a tape passing around this box and through the lock, and sealed with our private seal.

These various seals remained intact, except when broken by us to admit the milk of each milking, or to draw off the cream.

We were also present when the cream was placed in the churn, remained while it was being churned, and weighed the unsalted butter ; the salt added was one ounce to the pound, and we then reweighed the salted butter.

The butter was washed thoroughly, taken out of the churn, and worked as long as any water could be got from it. It was then salted, one ounce to the pound, and reworked. In both instances it was worked to our entire satisfaction, making a first-class article of marketable butter.

From the time of milking until the butter had been finally weighed, the milk, cream and butter were either in our sight or securely sealed and locked in the creamer or box described above.

We tested the scales carefully and found them to be correct.

The cow was fed three times a day on ground oats, corn, and a small quantity

of cottonseed meal (one quart per day), the whole mixture amounting to twenty-one pounds per day, in three feeds, morning, noon and night. She also had the run of a good blue-grass pasture with the rest of the herd. Her appetite remained good during the entire test, and she would have eaten more, in our judgment, had it been given her.

Total milk yield of Mamelle for seven days, two hundred and fifty-six pounds one ounce, which churned twenty-two pounds four and one quarter ounces of worked, unsalted butter, which, when salted, one ounce to the pound, and reworked made twenty-one pounds eight and one quarter ounces of butter ready for market.

In both instances, before and after salting, the butter was worked as long as any water could be drained from it.

The following is the detailed report of her milk and butter yield :

June 5, 6 A.M.	milked dry.		
" 5, 6 P.M.	19 lbs. 10 oz.	38 lbs. 4 oz.	
" 6, 6 A.M.	18 " 10 "		
" 6, 6 P.M.	19 " 2 "	37 " 4 "	
" 7, 6 A.M.	18 " 2 "		
" 7, 6 P.M.	17 " 10 "	36 " 4 "	
" 8, 6 A.M.	18 " 10 "		
" 8, 6 P.M.	16 " 12 "	33 " 6 "	
" 9, 6 A.M.	16 " 10 "		
" 9, 6 P.M.	19 " 14 "	37 " 7½ "	
" 10, 6 A.M.	17 " 9½ "		
" 10, 6 P.M.	20 " 9½ "	38 " 3½ "	in heat.
" 11, 6 A.M.	17 " 10 "		
" 11, 6 P.M.	17 " 6 "	35 " 4 "	
" 12, 6 A.M.	17 " 14 "		
Seven days' milk		256 lbs. 1 oz.	

First churning, two and a half days' cream, churned at 4 P.M., June 10th ; temperature, 59° ; time of churning, fifteen minutes ; worked, unsalted butter, eight pounds eight and one quarter ounces ; salted, one ounce to the pound, and reworked made seven pounds eight and one quarter ounces.

Second churning, two days' cream, churned at 3.30 P.M. June 12th ; temperature, 59° ; time of churning, twenty-one minutes ; worked, unsalted butter, six pounds twelve ounces ; salted, one ounce to the pound, and reworked made seven pounds.

Third churning, two days' cream, churned at 3.50 P.M., June 15th ; temperature, 58° ; time of churning, twenty minutes ; worked, unsalted butter, seven pounds ; salted, one ounce to the pound, and reworked made seven pounds.

Making seven days' yield of worked, salted butter twenty-one pounds eight and one quarter ounces.

Mamelle 20,804 was dropped March 24th, 1883, and was therefore twenty-six months old when the test began. She dropped her first calf, a heifer, to Gold Basis 4038, April 26th, 1885.

Mamelle is by Gold Basis 4038, out of Jazel's Maid 11,011.

Gold Basis now stands at the head of Mr. Malone's herd. He is by Gilderoy 2107, out of dam imported Regina 2d 2475.

George H. Harding.
M. M. Gardner.

Mr. F. Bronson, *President American Jersey Cattle Club:*

Dear Sir: Having had business to attend to, and not being able to be present at the test of Tette, I appointed Mr. George H. Harding, the gentleman who assisted me in the test of Mamelle 20,804, to conduct this test, and I vouch for same as being correct.

M. M. Gardner.

He makes the following report:

Test of Tette 20,802.

Tette 20,802 was milked clean in my presence Sunday evening June 7th, 1885. The first milking included in test was on Monday, June 8th, 6 A.M. She was milked twice a day during the test, morning and evening, at 6 A.M. and 6 P.M.

I was present at each of the fourteen milkings, and did not lose sight of the milk until after it had been placed in a four-can Cooley creamer. The lids of the creamer were securely locked by locks of my own; a tape was then passed entirely around the creamer and through the locks, and seals firmly fixed to the wood, on the tape, and each stamped with my private seal.

The cream, on being removed from the creamer, was placed in tin cans, which were put in a large wooden box made for the purpose. This box was also locked with my lock, a tape passing around the box and through the lock, and sealed with my private seal. These various seals remained intact, except when broken by me to admit the milk of each milking or to draw off the cream.

I was also present when the cream was placed in the churn; remained while it was being churned, and weighed the unsalted butter. The salt added was one ounce to the pound, and after being reworked I then reweighed the salted butter.

The butter was washed thoroughly, taken out of the churn, and worked as long as any water could be got from it. It was then salted, one ounce to the pound, and reworked. In both instances it was worked to my entire satisfaction, making a first-class article of marketable butter. From the time of milking until the butter had

been finally weighed the milk, cream and butter were either in my sight or securely sealed and locked in the creamer or box described above.

I tested the scales and found them to be correct.

The cow was fed twice a day on ground oats, corn, and a small quantity of cottonseed meal (she received of the cottonseed meal three quarters of a quart per day), the whole mixture amounting to fourteen pounds per day in two feeds, morning and evening; she also had the run of a good blue-grass pasture with the rest of the herd. She ate her feed with a good deal of relish.

Total milk yield of Tette for seven days, one hundred and eighty-eight pounds four ounces, which churned seventeen pounds six ounces of worked, unsalted butter, which when salted, one ounce to the pound, and reworked made seventeen pounds six ounces ready for market.

In both instances, before and after salting, the butter was worked as long as any water could be drained from it.

The following is the detailed report of her milk and butter yield:

June 7, 6 P.M.	milked dry.		
" 8, 6 A.M.	10 lbs. 6 oz.	21 lbs. 8 oz.	
" 8, 6 P.M.	11 " 2 "		
" 9, 6 A.M.	11 " 12 "	25 " 8 "	
" 9, 6 P.M.	13 " 12 "		
" 10, 6 A.M.	12 " 6 "	27 " 0 "	
" 10, 6 P.M.	14 " 10 "		
" 11, 6 A.M.	13 " 2 "	27 " 12 "	
" 11, 6 P.M.	14 " 10 "		
" 12, 6 A.M.	13 " 10 "	29 " 4 "	
" 12, 6 P.M.	15 " 10 "		
" 13, 6 A.M.	13 " 14 "	28 " 4 "	in heat.
" 13, 6 P.M.	14 " 6 "		
" 14, 6 A.M.	13 " 10 "	29 " 0 "	
" 14, 6 P.M.	15 " 6 "		
Seven days' milk		188 lbs. 4 oz.	

First churning, two and a half days' cream, churned 8.40 A.M. June 12th; temperature, 59°; churned eleven minutes; worked, unsalted, five pounds ten ounces; salted, one ounce to pound, and reworked, five pounds six ounces.

Second churning, two and one half days' cream, churned 4.19 P.M. June 16th; temperature, 58°; churned twelve minutes; worked, unsalted butter, six pounds eight ounces; salted, one ounce to pound, and reworked, six pounds twelve ounces.

Third churning, two days' cream, churned 5.11 P.M. June 16th; temperature, 58°; churned six minutes; worked, unsalted butter, five pounds four ounces; salted, one ounce to pound, and reworked made five pounds four ounces, making seven days' yield of worked, salted butter seventeen pounds six ounces.

Tette 20,802 was dropped November 5th, 1882, and was therefore two years and seven months old when test was made. She dropped her first calf, a bull, May 21st, 1885, to Gold Basis 4038.

Tette is by Gold Basis 4038 and out of Syringa 3d 6778.

GEORGE H. HARDING.

Hilda D. 6683, Evelina of Verna 10,971, AND Edessa 21,844.

DEERFOOT FARM, SOUTHBOROUGH, MASS., July 21, 1885.

T. J. HAND, ESQ., *Secretary American Jersey Cattle Club*, 1 *and* 3 *Broadway, New York:*

DEAR SIR: Having been appointed by Messrs. Alvord and Taylor, of the Executive Committee, I went to Verna Farm, Greenfield Hill, Conn., June 22d, to test three cows for the President of the Club, F. Bronson, Esq.—Hilda D. 6683, last calf March 22d, 1885; Evelina of Verna 10,971, last calf March 31st, 1885, and Edessa 21,844, a two-year-old heifer, last calf March 14th, 1885. All three were fine animals that would attract attention anywhere, and all had first-class udders.

At 6 P.M. on the night of my arrival I saw the cows milked out dry, and from the next morning everything pertaining to the milk was under my personal supervision and under my private lock and seal.

The first three days the cows were turned out (only during the day) into a field of about two acres, seeded down last autumn, where the feed was very rank and past the bloom.

Afterward, at my suggestion, they were turned into an old pasture.

Hilda D. was very lame during the entire test, and after the first day her grain was reduced. (See tabulated report.)

All the butter was thoroughly and carefully worked, ready for market, before the final weighing.

Professor Babcock, of the New York Experiment Station, was with me for five days, and his report I add to mine. He was present at all the milkings while at Verna, and took samples of the same for analysis.

Yours very sincerely, E. BURNETT.

N. Y. Agricultural Ex. Station, Dr. E. L. Sturtevant, *Director.*
Geneva, N. Y., July 16, 1885.

F. Bronson, Esq., *President Jersey Cattle Club, New York City:*

Dear Sir: I herewith forward you the official report by Mr. Babcock of our observations at the butter tests, commencing June 23d, of Hilda D., Evelina of Verna, and Edessa.

Very truly yours, E. Lewis Sturtevant, *Director.*

Geneva, N. Y., July 16, 1885.

Dr. E. Lewis Sturtevant, *Director New York Agricultural Experiment Station:*

Sir: Through the courtesy of Mr. F. Bronson, of Southport, Conn., and by your orders, I was present as representative of the New York Agricultural Experiment Station during a portion of a "seven-day" butter test of three of his Jersey cows—Hilda D., Evelina of Verna, and Edessa.

The test commenced on the morning of June 23d, and was under the official supervision of Mr. Edward Burnett. I was present till June 27th, and made determinations of the solids and fat in the milk of each milking up to that time, and in the skimmed milk and buttermilk. Complete analyses were also made of the well-worked butter from the first and the last churning as sent to the Station.

The analytical results are presented in the following tables:

Hilda D.

Milk.

Date.	Weight of Milk.		Solids.	Fat.	Fat.
	lbs.	oz.	per cent.	per cent.	oz.
June 23, 5 A.M.	17	4	15.74	5.71	15.76
" 23, 1 P.M.	12	1	16.23	6.33	12.22
" 23, 9 P.M.	12	0	15.33	5.75	11.04
" 24, 5 A.M.	12	10	15.74	5.91	11.94
" 24, 1 P.M.	10	15	15.40	5.52	9.66
" 24, 9 P.M.	11	12	16.26	5.73	10.77
" 25, 5 A.M.	12	6	15.90	5.41	.....
" 25, 1 P.M.	11	3	16.05	5.90	.....
" 25, 9 P.M.	12	2	15.79	5.96	.....
" 26, 5 A.M.	12	11	15.64	5.75	.....
" 26, 1 P.M.	11	2	15.63	5.45	.....
" 26, 9 P.M.	11	15	15.37	5.70	.....

Skimmed Milk.

	Per cent. of Solids.	Per cent. of Fat.
From milk of June 23, 5 A.M. and 1 P.M.	10.53	.092
" " " " 23, 9 P.M.	10.52	.096
" " " " 24, 5 A.M and 1 P.M.	10.28	.091
Buttermilk from churning of cream of June 23 and 24,	10.80	.340*

Butter.

	Churning of June 27 from Cream of June 23–24.	Churning of July 1.
Weight of butter	5 lbs. 8 oz.	
Water, per cent	14.51	21.47
Ash, per cent	6.42	3.26
Fat, per cent	78.51	74.09
Caseine, per cent	.62	.84
Fat in butter, ounces	69.09	

EVELINA OF VERNA.

Milk.

Date.	Weight of Milk.		Solids.	Fat.	Fat.
	lbs.	oz.	per cent.	per cent.	oz.
June 23, 5 A.M.	18	7	14.45	5.06	14.93
" 23, 1 P.M.	12	10	16.57	6.59	13.31
" 23, 9 P.M.	12	2	15.28	5.25	10.19
" 24, 5 A.M.	13	4	14.92	5.01	10.62
" 24, 1 P.M.	11	12	15.48	6.01	11.30
" 24, 9 P.M.	12	6	15.11	5.58	11.05
" 25, 5 A.M.	12	9	15.21	5.77	.....
" 25, 1 P.M.	12	2	15.50	5.81	.....
" 25, 9 P.M.	11	14	14.84	5.30	.....
" 26, 5 A.M.	13	1	14.96	5.33	.....
" 26, 1 P.M.	11	15	15.53	6.02	.....
" 26, 9 P.M.	12	1	14.80	5.66	.....

* Extracted with ether and includes any free lactic acid present.

Skimmed Milk.

	Per ct. of Solids.	Per ct. of Fat.
From milk of June 23, 5 A.M. and 1 P.M.	9.96	.07
" " " " 23, 9 P.M.	10.00	.44
" " " " 24, 5 A.M. and 1 P.M.		.12
Buttermilk from churning of June 23d and 24th	10.22	.63*

Butter.

	Churning of June 27 from Cream of June 23 and 24.	Churning of July 1.
Weight of butter	5 lbs. 5 oz.	
Water, per cent	14.60	12.65
Ash, per cent	1.95	1.33
Fat, per cent	83.21	84.91
Caseine, per cent	0.51	0.69
Fat in butter, ounces	70.73	

EDESSA.

Milk.

Date.	Weight of Milk.		Solids.	Fat.	Fat.
	lbs.	oz.	per cent.	per cent.	oz.
June 23, 5 A.M.	12	8	14.25	5.15	10.30
" 23, 5 P.M.	11	11	14.76	5.68	10.62
" 24, 5 A.M.	12	10	14.89	4.85	.....
" 24, 5 P.M.	12	2	14.64	4.94	.....
" 25, 5 A.M.	12	10	15.57	4.98	.....
" 25, 5 P.M.	12	6	14.40	4.51	.....
" 26, 5 A.M.	12	6	15.31	4.72	.....
" 26, 5 P.M.	13	0	15.02	5.21	.....

Buttermilk from churning of whole milk of June 23d: Solids, 12.08; Fat, 2.23.

Butter.

	Churning of June 26 from Whole Milk of June 23.	Churning of July 1.
Weight of butter	1 lb. 4 oz.	
Water, per cent	15.85	14.37
Ash, per cent	8.83	5.13

* Extracted with ether and includes any free lactic acid present.

	Churning of June 26 from Whole Milk of June 23.	Churning of July 1.
Fat, per cent	74.01	79.63
Caseine, per cent	0.52	0.56
Fat in butter ounces	14.8	

The milk of Hilda D. for June 23d and 24th, which constituted the first churning, contained in the aggregate, according to the analyses, 71.39 ounces of butter fat, 69.08 ounces or 96.79 per cent. of which was recovered in the butter.

Evelina's milk for the same time contained 71.4 ounces of butter fat, and there were recovered in the butter 70.73 ounces, or 99 per cent.

Edessa's milk for June 23d contained 20.92 ounces of fat, and the butter from this milk contained 15.08 ounces, or 79.01 per cent.

The melting-points of the butter fats in the above samples of butter are as follows:

Hilda D.	96 F.
Evelina	93 F.
Edessa	89 F.
Herd	92 F.

Further details of the above tests are omitted, as these will appear in the report of the official tester, Mr. Edward Burnett.

Very truly yours, S. M. Babcock.

TEST OF **Hilda D.** 6683, PROPERTY OF F. BRONSON, ESQ., GREENFIELD HILL, CONN.

Date. 1885. June.	Weather.	Feed and Grain.	Milked at 5.10 A.M. 1.10 P.M. 9.10 P.M. lbs.	oz.	Total Milk each Day. lbs.	oz.	Churnings. Date.	Temperature.	Time. H.	M.	Condition of Butter.	Weight of Butter. From the Churn. lbs.	oz.	Worked. lbs.	oz.	Salted 1oz to the Pound. lbs.	oz.	Remarks.
23	Fine, about 68°....	Pasturage and 10 lbs. corn meal, 10 lbs. pea meal, 8 lbs. crushed oats, 2 lbs. bran, and 1 pt. linseed meal.	17	4			June.											Milk set (about 92°) in Cooley Creamer, 36 hours; water, 40° to 45°.
			12	1														
			12	0	41	5												
24	Fine, about 70°....	Pasturage and 5 lbs. corn meal, 5 lbs pea meal, 6 lbs. crushed oats, and 1 pt. linseed meal.	12	10														
			10	15														
			11	12	35	5	27	66°	1	10	Granular, fine color.	7	15	5	7	5	8	Cream ripened at 62°, and churned in Moseley and Stoddard barrel churn and rinsed three or four times with brine. Thoroughly worked and salted.
25	Fine, about 75°....	Same as above........	12	8														
			11	3														
			12	2	35	13												
26	Sultry, about 78°..	Same as above.........	12	11														
			11	2														
			11	15	35	12	29	65°	0	40	Granular, fine color.	8	13	8	8	8	1	
27	Fine, about 78°....	Same as above..	11	13														
			12	2														
			12	0	35	15												
28	Foggy A.M.; P.M. warm, about 80°.	Same as above.........	12	7														The preparing and working of butter at each churning occupied from 25 to 30 minutes
			10	9														
			11	8	34	8	July 1	63°	1	20	Granular, fine color.	7	8	7	6	7	9½	
29	Hot and sultry, about 82°........	Same as above........	13	5														
			10	12														
			6	13	30	14												
					249	8						24	4	21	5	21	2¼	

E. BURNETT, *Tester*.

TEST OF **Evelina of Verna** 10,971, PROPERTY OF F. BRONSON, ESQ., GREENFIELD HILL, CONN.

DATE.	WEATHER.	FEED AND GRAIN.	MILKED AT 5.10 A.M. 1.10 P.M. 9.10 P.M.		TOTAL MILK EACH DAY.		CHURNINGS.			CONDITION OF BUTTER.	WEIGHT OF BUTTER.						REMARKS.
1885. June.							Date.	Temper-ature.	Time.		From the Churn.		Worked.		Salted 1oz. to the Pound.		
			lbs.	oz.	lbs.	oz.			Min.		lbs.	oz.	lbs.	oz.	lbs.	oz.	
23	Fine, about 68° ...	Pasturage and 10 lbs. corn meal, 10 lbs. pea meal, 8 lbs. crushed oats, 2 lbs. bran, 1 pt. linseed meal.	18	7			June.										Milk set about 92° in Cooley Creamer about 36 h'rs. Water, 40° to 45°. Cream ripened at 62° and churned in Moseley and Stoddard barrel churn. Butter when in fine granular form rinsed with three or four applications, then thoroughly worked and salted. The preparing and working of butter occupied for each churning from 25 to 30 minutes.
			12	10													
			12	2	43	3											
24	Fine, about 70°.. .	Same................	13	4													
			11	12													
			12	6	37	6	27	66°	40	Granular, fine color.	6	8	5	9½	5	5	
25	Fine, about 75°....	Same.........	12	9													
			12	2													
			11	14	36	9											
26	Sultry, about 78° ..	Same.........	13	1													
			11	15													
			12	1	37	1	29	66°	31	Granular, fine color.	9	7½	8	10	8	3½	
27	Fine, about 78°....	Same................	13	0													
			11	12													
			12	9	37	5											
28	Foggy A.M.; showers P.M., about 80°	Same................	13	15													
			12	1													
			13	0	39	0	July 1	63°	49	Granular, fine color.	7	6	6	4	6	2	
29	Hot and sultry, about 82°...	Same................	14	8													
			12	2													
			7	11	34	5											
					264	13					22	5½	20	7½	19	10½	

E. BURNETT, *Tester.*

TEST OF **Edessa** 21,844, PROPERTY OF F. BRONSON, ESQ., GREENFIELD HILL, CONN.

Date. 1885. June.	Weather.	Feed and Grain.	Milked at 5.30 A.M. 5.30 P.M. lbs.	oz.	Total Milk each Day. lbs.	oz.	Churnings. Date.	Temperature.	Time. H.	M.	Condition of Butter.	Weight of Butter. From the Churn. lbs.	oz.	Worked. lbs.	oz.	Salted 1oz. to the Pound. lbs.	oz.	Remarks.
23	Fine, about 68°	Pasturage and 8 lbs. pea meal, 8 lbs. corn meal, 9 lbs. crushed oats, 3 lbs. bran, 1 pt. linseed meal.	12	8			June.											First three and one half days' milk set in shallow pans at 62°, churned whole after 60 and 70 hours' setting; mostly loppered.
			11	11	24	3												
24	Fine, about 70°	Same.	12	10														
			12	2	24	12	26	65°	1	30	Granular, soft, color fair.	....		1	3	1	4	
25	Fine, about 75°	Same.	12	10														Last three and one half days' milk set in "Cooley Creamer" 36 hours.
			12	6	25	0	28	68°	0	30	Granular, soft, color fair.	....		1	6½	1	7	
26	Sultry, about 78°	Same.	12	6														
			13	0	25	6	29	64°	2	50	Granular, good color.	....		2	0	2	2	
27	Fine, about 78°	Same.	11	4														All the churnings were made in Moseley & Stoddard churn, and the preparing and working of butter each time occupied from 25 to 30 minutes.
			12	3	23	7												
28	Foggy A.M., showers P.M., about 80°	Same.	12	1														
			11	10	23	11												
29	Hot and sultry, about 82°	Same.	12	6														
			12	6	24	12	July 1	65°	0	15	Granular, good color.	6	3½	5	13	5	9½	
					171	3								10	6½	10	6½	

E. BURNETT, *Tester*.

RULES FOR OFFICIAL BUTTER TESTS.

[*To take effect June 29th*, 1885.]

ADOPTED BY THE BOARD OF DIRECTORS OF THE AMERICAN JERSEY CATTLE CLUB, UNDER AUTHORITY OF AMENDED BY-LAWS, SECTION 7, ART. VI.

The following rules shall be followed in every butter test:

1. The tester shall see the cow completely milked out at the beginning of the test.

2. The tester shall be present at each milking throughout the entire test, and must see the milk weighed, and keep accurate records of the net weight of each milking and time of milking.

3. Immediately upon the milk being weighed the tester must see the milk securely placed under lock and seal. In case a creamer is used the tester must securely lock the creamer containing the milk with a padlock to be provided by such tester, and must seal the same by passing a ribbon or band of tape around the creamer, and sealing such tape or band with a seal not furnished by the owner.

In case the milk is set in pans or crocks the room in which it is so set must be securely locked by the tester and the doors and windows thereto sealed.

4. The tester must be present at the drawing off of the cream, and must retain it securely with the same precautions as are set out in last preceding section.

5. When the owner of the cow considers the cream or whole milk ripe for churning the tester must see the cream or whole milk placed in the churn and remain until it is churned, see the butter thoroughly worked, weighed, salted, reworked and reweighed; he shall weigh the butter before salting, and after being salted and reworked. In salting, one ounce of salt to every pound of butter shall be used, the tester keeping a record and reporting to the Club the temperature at which the cream or whole milk was churned, and length of time required in churning. The quantity of butter with which the cow shall be credited shall be salted butter ready for market. The tester may require as many churnings to be made of the cream or whole milk as he may deem necessary.

6. The tester may leave the feeding of the cow and the quantity given to the discretion of the owner, or he may supervise the feeding, in order that no improper ingredient may be given her; but he shall not in any way limit the quantity of the feed so given. In all cases the affidavit of the feeder of the cow shall be required as to the quantity and composition of the feed so given. The owner of the cow shall also make affidavit as to his or her confidence in the accuracy of the test to the best of his or her knowledge, and as to his or her confidence in the man who fed the cow.

7. In the event of the owner, or the person in charge of such cow, refusing to comply with the requirements of these regulations, the tester shall discontinue the

test, and report to the President the facts of the case, and the party so refusing shall forfeit his or her preliminary deposit of $50.

8. Two milkings only per day shall be made, unless the cow is incommoded thereby.

9. A sample of the butter made in the test may be taken by the tester in person for analysis by a competent analyst.

10. The above rules shall apply in all cases to any deputy or deputies appointed in accordance with Section 2, Art. VI., of By-Laws.

11. These regulations may be altered at any regular meeting of the Board of Directors.

ADDITIONAL RULES FOR BUTTER TESTS.

1. A book shall be kept by the Secretary, to be known as the "Official Butter Test Book," in which all tests heretofore made by an appointee of the Club, or which shall hereafter be made by the Club, shall be entered.

2. An official tester may be appointed by the Board of Directors, and shall hold his office during its pleasure, and shall receive such compensation as the Board may fix. Such official tester shall have power, subject to the approval of the President, to appoint a deputy or deputies to assist him.

Pet of Rose Lawn 11,326.

NEW YORK, June 30, 1885.

F. BRONSON, ESQ., *President of the American Jersey Cattle Club:*

DEAR SIR: In accordance with your letter of the 17th inst. appointing me a committee to conduct the test of the Jersey cow Pet of Rose Lawn 11,326, I went to Paterson on Saturday, the 20th, and started the test that evening by thoroughly "stripping out" the cow.

Pet of Rose Lawn was five years old in May, and dropped her fourth calf April 15th. She is slightly above the medium size, of a light cream fawn color of a very uniform tint. She fills the eye as a handsome Jersey cow in most respects, has a capacious barrel, rich skin color, a mellow hide, a large, well-shaped udder and teats, with full and tortuous milk-veins, and a Limousine escutcheon of the first order. The udder measured over fifty inches in circumference.

In conducting the test the rules of the Club in regard to precautions against fraud were closely followed, and the results are tabulated in duplicate, as you requested.

I do not think the test, though accurate in every particular, really does the cow justice, for the severe drouth which prevailed so parched the pasture upon which she had been depending for a large portion of her food that it became brown, almost entirely losing its green color, and caused, no doubt, the nearly uniform decrease in milk and butter.

Very respectfully, MASON C. WELD.

PET OF ROSE LAWN 11,326.

AT 3 YEARS OLD.

Columbiad Type.

CREAM COTTAGE HERD.

J. S. ROGERS, PATERSON, NEW JERSEY.

BUTTER TEST OF **Pet of Rose Lawn** 11,326, PROPERTY OF JACOB S. ROGERS, ESQ.

DATE.	WEATHER.	TEMPERATURE.		FEED.	Time of Finishing Milking.	MILK.		Churned Whole at about 63°.		BUTTER.	WEIGHT.	
		Of Dairy.	Of Cow.	In addition to Pasturage, which was seriously parched.		At each Milking.	Daily Total.	Date.	Duration.	Condition, Character, Quality, Color.	Fresh.	Salted, 1 oz. to lb.
						lbs. oz.	lbs. oz.		H. M.		lbs. oz.	lbs. oz.
June 20 ..	E., Fair, warm..........	....	102½	Evening, 3 qts. corn meal, 2 qts. grd. oats.	5 41	Stripped out dry.						
" 21....	M., Clear, cool....... ...	60½		4 qts. ground oats, 1 qt. corn meal.	5 40	19 8½						
	E., Fair, warm...... ...	64	102¾	4 qts. ground oats, 1 qt. corn meal.	5 45	17 4½	36 13	24th	0 45	Granular, firm, excellent, high.	2 4	2 6
" 22....	M., Fair, sultry	62		4 qts. ground oats, 1 qt. corn meal.	5 48	19 6½						
	E., Fair, warm..........	64	102¾	Noon and evening the same.	5 50	16 6½	35 13	25th	1 15	Granular, firm, excellent, high.	2 3	2 5
" 23....	M., Cloudy, cold........	60		4 qts. ground oats, 1 qt. corn meal.	5 40	16 13						
	E., Fair, cool	61	101¼	Noon and evening the same.	5 50	17 10	34 7	26th	1 00	Granular, firm, excellent, high.	1 15	2 1
" 24. ..	M., Clear, cool..........	59		4 qts. ground oats, 1 qt. corn meal.	5 55	15 15						
	E., Clear, warm.........	60	102¼	Noon and evening the same.	5 55	18 7	34 6	27th	0 45	Granular, firm, excellent, high.	2 ½	2 2½
" 25....	M., Clear, cool	60		4 qts. ground oats, 1 qt. corn meal.	5 55	16 2½						
	E., Clear, warm.........	60	102¾	Noon, evening, and night the same.	5 45	20 1½	36 4	28th	0 45	Granular, firm, excellent, high.	2 7	2 9
" 26 ..	M., Overcast, warm......	63		3 qts. grd. oats, 2 qts. corn meal, 2 qts. bran.	5 40	17 4½						
	E., Hazy, cool	63	102¼	Noon, 2 qts. oats, 2 corn meal, 2 bran. Evening and night the same.	5 45	17 3	34 7½	29th	0 32	Granular, firm, excellent, high.	2 1½	2 3½
" 27....	M., Foggy, warm	64		2 qts. ground oats, 2 qts. meal, 2 bran.	6 00	17 9½						
	E., Clear, warm.........	64	102	Noon and evening the same.	5 41	16 14	34 7½	30th	1 00	Granular, firm, excellent, high.	1 12	1 13½
						Milk ..	246 10			Butter	14 11	15 8½

The test was essentially a public one, as any person who wished could witness every operation. The dairy was visited and operations witnessed by the proprietor and Mr. D. Pennington, James Smith, John Delade, Mrs. M. A. Vasseur, Mrs. Van der Hoven, and Mrs. Weld.

The entire management of the test was intrusted to Mr. John Vasseur, Mr. Rogers' farm manager.

June 30th, 1885.

MASON C. WELD.

Ethleel 2d 32,291.

Mr. John M. Thompson, of Nashville, was elected by the American Jersey Cattle Club to conduct the test. Mr. Thompson appointed Dr. H. B. Titcomb, of Columbia, to personally supervise the test.

Dr. Titcomb's Report.

As requested by you and under your appointment, I took charge of the test of the Jersey cow Ethleel 2d 32,291, the property of John A. McEwen, Nashville, Tenn., at the farm of the Columbia Jersey Cattle Company, at Columbia, Tenn., June 30th, 1885, at 6.20 P.M., at which time I saw the cow milked thoroughly dry. I saw her milked thereafter as follows:

Time of Milking.	Amount of Milk.
July 1, 6.20 A.M.	11 lbs. 5 oz.
" 1, 6.20 P.M.	11 " 7 "
" 2, 6.20 A.M.	11 " 12 "
" 2, 6.20 P.M.	11 " 1 "
" 3, 6.10 A.M.	12 " 2 "
" 3, 6.15 P.M.	*11 " 5 "
" 4, 6.25 A.M.	11 " 11 "
" 4, 6.30 P.M.	11 " 8 "
" 5, 6.30 A.M.	10 " 11 "
" 5, 6.25 P.M.	9 " 12 "
" 6, 6.35 A.M.	10 " 3 "
" 6, 6.20 P.M.	9 " 9 "
" 7, 6.20 A.M.	11 " 0 "
" 7, 6.30 P.M.	10 " 11 "

Making in all for seven consecutive days one hundred and fifty-five pounds eleven ounces of milk. At each milking the milk did not leave my sight until it was strained, put in a stone jar, and placed in the test room, the windows of which were protected by iron rods and wire gauze, upon which I placed my seal, and double locked the door, and placed my seal upon that, and during the entire test no seal was broken except by myself. Neither was the milk handled, except in my presence and sight, until it was placed in the churn, churned and the butter worked, weighed, salted, reworked and reweighed.

July 3d, 1885, we commenced churning the first day's milk at 3.20 P.M., at the temperature of 63°; churned sixteen and one half minutes, and took up four pounds

* A few ounces spilled.

three ounces of thoroughly worked butter; added four ounces of salt, reworked, and had four pounds six ounces of butter.

I proceeded in the same manner, with the temperature of the milk about the same, the six succeeding days, with the following results, adding one ounce of salt with each pound of butter:

July 4th, 2.55 P.M. Churned second day's milk fifteen minutes. Butter worked and taken up, four pounds two ounces: butter salted and reworked, four pounds five ounces.

July 5th, 3.53 P.M. Churned third day's milk fourteen and one half minutes. Butter worked and taken up, three pounds fourteen ounces; butter salted and reworked, four pounds one ounce.

July 6th, 3.07 P.M. Fourth day's milk churned sixteen and one half minutes. Butter worked and taken up, four pounds three ounces; butter salted and reworked, four pounds five ounces.

July 7th, 2.45 P.M. Fifth day's milk churned twelve and one half minutes. Butter worked and taken up, four pounds two ounces; butter salted and reworked, four pounds five ounces.

July 8th, 3.30 P.M. Sixth day's milk churned ten and one half minutes. Butter worked and taken up, four pounds thirteen ounces; butter salted and reworked, five pounds.

July 9th, 3.20 P.M. Seventh day's milk churned thirteen minutes. Butter worked and taken up, four pounds five ounces; butter salted and reworked, four pounds eight ounces.

Total of reworked butter for seven days, thirty pounds fifteen ounces.

The churn used in the above test was a patent churn called the "Wonderful."

The milk when placed in the test room in the stone jar was put in running water which ranged at a temperature of from 60° to 61°, and on the evening of the second day the morning and evening milk of each day was put together and remained until the next afternoon when churned, adding only enough water at the time of transferring and mixing the morning and evening milk to rinse the cream from the jars.

I had a copy of the company's testing rules by me, and governed myself by them.

At each churning there were several present to witness the taking out and weighing of the butter, among whom were J. M. Mays, President of the First National Bank at Columbia; Major Campbell Brown; M. C. Campbell and Horace Polk, of Spring Hill; Mr. Malone, Edward Baxter and wife, of Nashville; L. W. Cooper, of New Orleans.

Ethleel 2d 32,291 is a rather small, smooth, handsome, light gray heifer.

She was dropped October 31st, 1882; therefore at the beginning of the test,

July 1st, 1885, she was only two years eight months old. Her sire was Lord Harry 3445; her dam Ethleel 18,724.

AFFIDAVIT.

I, H. B. Titcomb, do solemnly swear the above test is correct, to the best of my knowledge and belief.

(Signed) H. B. Titcomb.

Sworn and subscribed to before W. B. Frierson, N. P.

The feeding of Ethleel 2d during seven days' official test was composed of one gallon of cornhearts meal and one half gallon corn bran, fed her morning and evening, permitting her to run on a short pasture during the day with the balance of the herd. This heifer was calved at the Columbia Cattle Company's farm, and sold at their May sale, at Nashville, to Mr. McEwen, for $890. Affidavits were given of feed and management by West Gannaway, Frank Dale and William J. Webster, and John A. McEwen, owner of the cow.

Matilda 4th 12,816.

Frederic Bronson, Esq., *President of the American Jersey Cattle Club:*

Dear Sir: I have the honor to report the following test of Matilda 4th 12,816, the property of Messrs. Miller and Sibley, of Franklin, Pa., made in my presence and under my private locks and seals.

Matilda 4th was dropped March 29th, 1880, had her last calf April 1st, 1885, and is not yet served. She is a pure Dauncey cow; sire, Stoke Pogis 1259; dam, imported Matilda 3238. In color she is a bronze fawn, shading to black; body good length, large barrel, straight back, square rump, short legs, neat head; rather inclined to flesh, but not beefy; large, capacious udder, well-placed teats, but smaller than desirable for so large a milker; good constitution, and in general appearance closely resembling Eurotas 2454, without her pendent udder.

At 9 a.m., July 6th, she was stripped dry, and each day thereafter was milked punctually at 5 a.m., 1 p.m. and 9 p.m. I was present at every milking, and the milk and cream were not out of my sight except when under lock and seal.

The feeding was left entirely to the judgment of Mr. George B. Jobson, manager, and one of the herdsmen, William A. Shorts, whose affidavit as to quantity is hereto annexed. To this is also attached Mr. J. C. Sibley's affidavit as to his confidence in the man's statement and his belief in the accuracy of the test. During the test the cow was in the barn at night and on pasture about ten hours each day. The quality of the grass was poor on account of its age, and she appeared to derive but little benefit from it.

While in the barn she was fed as much clover hay as she would eat with relish. The weather was extremely sultry during most of the test, and its effect was very apparent upon the cow. The milk was set in the Cooley cans, in running spring water, the temperature of which was taken before placing the new milk, and afterward ice was added. Each can was allowed to stand thirty hours, when part of the milk was drawn off, leaving about an equal quantity of milk and cream. The first two days' cream was churned on the 11th. After drawing off the buttermilk and washing the butter in the churn it was at once weighed, salted, one ounce to the pound, worked, allowed to stand ten minutes, reworked and reweighed. The second churning consisted of the third day's cream. In this and subsequent churnings the butter was thoroughly worked before weighing, then salted, worked, allowed to stand ten minutes, reworked and reweighed. The time between end of churning and drawing of buttermilk was about ten minutes in each instance; between drawing off buttermilk and first weighing, ten minutes (except in the first churning), and ten minutes between each weighing. A tabulated statement of the test is hereto annexed.

The second churning was made July 13th, the third on the 16th, consisting of fourth and fifth day's cream, and the final churning on the 17th, making a total of twenty-one pounds eight and one half ounces.

Yours truly, William S. Taylor.

Franklin, Pa., July 17, 1885.

Franklin, Pa., July 16, 1885.

F. Bronson, Esq., *President American Jersey Cattle Club:*

My Dear Sir: The man who fed the cow Matilda 4th 12,816 during her official test, Mr. W. A. Shorts, has been in our employ for many years. We therefore give full credence to the statement sworn to by him as to the feed consumed by the cow during the test.

I desire further to state my full confidence in the accuracy of her test under the supervision of Mr. W. S. Taylor, and hope that all official testers appointed by you may be as careful in their supervision and as watchful of every detail as he has been.

Respectfully yours, J. C. Sibley, for Miller & Sibley.

Commonwealth of Pennsylvania, County of Venango, *ss.:*

Before me, the subscriber, personally appeared the above-named, J. C. Sibley, who, upon being legally sworn, says that the foregoing facts are true and correct to the best of his knowledge and belief.

Sworn and subscribed before me this 18th day of July, a.d. 1885.

W. J. Breene, Notary Public.

Statement and Affidavit of William A. Shorts.

I am in the employ of Messrs. Miller & Sibley, of Franklin, Pa.

I had sole charge of the feeding of Matilda 4th 12,816, A. J. C. C. H. R., during the test, beginning at 9 o'clock P.M., July 6th, and terminating at 9 o'clock P.M., July 13th, 1885.

The feed that was fed wet consisted of two quarts sifted oats, two quarts pea meal, one quart oil-cake meal, and one quart wheat middlings, making eight pounds, or in that proportion.

The dry feed consisted of sifted oats, pea meal, and oil-cake meal, mixed in equal parts.

The following is a true statement of all the feed given to the cow between the hours and dates given above, viz.:

Between.	Lbs. Wet.	Lbs. Dry.
July 6, 9 P.M. and July 7, 5 A.M.	8	2½
" 7, 5 A.M. " " 7, 1 P.M.	12	
" 7, 1 P.M. " " 7, 9 P.M.	8½	
" 7, 9 P.M. " " 8, 5 A.M.	8	2½
" 8, 5 A.M. " " 8, 1 P.M.	15	2
" 8, 1 P.M. " " 8, 9 P.M.	7	
" 8, 9 P.M. " " 9, 5 A.M.	8	
" 9, 5 A.M. " " 9, 1 P.M.	8	2
" 9, 1 P.M. " " 9, 9 P.M.	8	
" 9, 9 P.M. " " 10, 5 A.M.	8	
" 10, 5 A.M. " " 10, 1 P.M.	15	2
" 10, 1 P.M. " " 10, 9 P.M.	8	
" 10, 9 P.M. " " 11, 5 A.M.	8	
" 11, 5 A.M. " " 11, 1 P.M.	16	2
" 11, 1 P.M. " " 11, 9 P.M.	8	
" 11, 9 P.M. " " 12, 5 A.M.	8	
" 12, 5 A.M. " " 12, 1 P.M.	16	2
" 12, 1 P.M. " " 12, 9 P.M.	8	
" 12, 9 P.M. " " 13, 5 A.M.	4	2
" 13, 5 A.M. " " 13, 1 P.M.	12	2
" 13, 1 P.M. " " 13, 9 P.M.	7	
Total	200½	19
Grand total of feed	219½ lbs.	

From 9 P.M. to 5 A.M. the cow was in the barn, and was fed clover hay as she would eat it; during the day she was in rather poor pasture about ten hours each day.

W. A. SHORTS.

Subscribed and sworn to before me, this 17th day of July, A.D. 1885.

E. H. LAMBERTON,
Notary Public.

[Seal.]

ANALYSIS OF THE BUTTER OF MATILDA 4TH 12,816.

NEW YORK AGRICULTURAL EXPERIMENT STATION,
GENEVA, N. Y., July 28, 1885.

T. J. HAND, ESQ., *Secretary American Jersey Cattle Club, No.* 1 *Broadway, New York:*

DEAR SIR: The butter sent by you from the test of Miller & Sibley's arrived with two of the packages broken. The two whole butters gave the following result:

No. 1, CHURNED JULY 11.

Water	14.17
Fat	80.70
Caseine	0.58
Ash	4.38
Melting-point of butter fat	91° F.

No. 3, CHURNED JULY 16.

Water	14.54
Fat	81.27
Caseine	0.54
Ash	3.61
Melting-point of butter fat	91° F.

In sending other samples please put in a little larger quantity, in order that we can have sufficient for duplicate determinations.

Very truly yours,

E. LEWIS STURTEVANT,
Director.

BUTTER TEST OF **Matilda 4th** 12,816.

1885. July.		Weather.	Temperature. Water.	Dairy.	Outside.	Barn.	Cow.	Feed. Wet.	Dry.	Time of Finishing Milking.	Milk. Each Milking.	Total for each day.	Temperature of Cream.	Duration of Churning.	Butter. Condition, Character, Quality, Color.	Weight. Fresh. lbs.	oz.	Salt. lbs.	oz.	Remarks.
								lbs.	lbs.		lbs.	lbs.								
7	5 A.M.	Cloudy	54	67°	...	74		8	2½	5 10	15									
	1 P.M.	Cloudy, close	54°	69°	...	78°		12	..	1 10	17									The wet feed consisted of 2 qts. sifted oats, 2 lbs. pea meal, 1 qt. oil-cake meal, and 1 qt. wheat middlings, making 8 lbs., or in that proportion.
	9 P.M.	Clear, close	52	66	...	74	101½°	8½	..	9 10	16¼	48¼								
8	5 A.M.	Heavy fog	53°	65	...	66°		8	2½	5 11½	15¾									
	1 P.M.	Clear, very hot	53	74	89	80°		15	2	1 08¼	18½									
	9 P.M.	Clear	52	70	76	78	102½°	7	..	9 07½	12¾	47	60	1 11	Granular, solid,					
9	5 A.M.	Clear	53	66	70	73°		8	..	5 11	19				excellent, high.	6	8	6	8	
	1 P.M.	Clear, very hot	54°	76	92°	86°		8	2	1 07½	15¼									
	9 P.M.	Thunder shower, also in afternoon	54°	72°	74	77°	103¼°	8	..	9 08½	16½	50¾	60	0 45	Granular, solid,					The dry feed consisted of sifted oats, pea meal, and oil cake meal mixed in equal proportions.
10	5 A.M.	Cloudy, heavy rain, and thunder during night.	54	67°	66°	71°		8	..	5 10	16¾				excellent, high.	3	4¼	3	7	
	1 P.M.	Light clouds	53°	68°	76	74°		15	2	1 08	14½									
	9 P.M.	Clear	52	63	60°	69	102⅕°	8	..	9 08¼	18	49¼								The cow was in barn at night and in pasture of poor quality about ten hours each day.
11	5 A.M.	Fog	52°	57°	56	61°		8	..	5 08¾	15¼									
	1 P.M.	Clear	53°	67°	74°	73°		16	2	1 08¼	16¼									
	9 P.M.	Clear	52°	58	56	67°	$101\frac{7}{10}$°	8	..	9 08¼	16¼	47¾	62°	0 28	Granular, solid,					
12	5 A.M.	Fog	52°	54	54°	57°		8	..	5 08	15¼				fair, medium...	5	11½	6	0¼	
	1 P.M.	Clear	53	68	80°	75°		16	2	1 08	16½									The temperature of the water (running spring water) was taken before setting each can, and afterward ice was added.
	9 P.M.	Clear	54°	64	62	71°	102°	8	..	9 08	15¾	47½								
13	5 A.M.	Cloudy	52°	60	60	64°		4	2	5 09	16¼									
	1 P.M.	Cloudy	53°	74°	82°	76°		12	2	1 07¾	15½				Granular, solid,					
	9 P.M.	Rain	53	64°	66°	69	101⅕°	7	..	9 08	13¾	45½	60°	0 37	excellent, high.	5	6½	5	9	
								T'l, 219½			T'l, 336				Total.....	20	14¼	21	8½	

1886.

Khelula 17,970.

BRIARCLIFF HERD, JAMES STILLMAN, SING SING, N. Y.

[*Abstract.*]

Tested January 5th to 12th, 1886, yielding 14 lbs. 6½ oz. of butter.

RATION.

Pounds of Grain: Corn meal, 9 lbs. daily, on the 5th, 6th, 7th, 8th and 9th only.

Pounds of Grain: Linseed cake as meal, 3 lbs. on the 5th, 6th, 7th, 8th and 9th only.

Pounds of Grain: Crushed oats, 6 lbs. on the 5th, 6th, 7th, 8th and 9th; 14 lbs. on the 10th and 11th.

Pounds of Grain: Wheat bran, 6 lbs. on the 5th, 6th, 7th, 8th and 9th; 14 lbs. on the 10th and 11th.

Pounds of Hay: 7 lbs. every day.

Pounds of Fodder: Ensilage of corn, 14 lbs. every day.

Pounds of Roots: Carrots, 15 lbs. every day.

The cow was fed six times daily, always ate heartily, and would have eaten much more. We considered it evident that the increase of feed changed the secretions from the production of milk and butter to that of fat, and the change of feed on the last two days showed improvement in both milk and apparent butter yield. She came in heat the last day of test.

(Signed) MASON C. WELD.

Cocotte 11,958.

BRIARCLIFF HERD, JAMES STILLMAN, SING SING, N. Y.

[*Abstract.*]

Tested January 5th to 12th, 1886, yielding 14 lbs. 6 oz. of butter.

RATION.

Pounds of Grain: Corn meal, 9 lbs. daily.

Pounds of Grain: Wheat bran, 7 lbs. daily.

Pounds of Grain: Crushed oats, 6 lbs. daily.

Pounds of Grain: Linseed-oil cake, 9 lbs. daily.

Pounds of Hay: 7 lbs. daily.

Pounds of Fodder: Ensilage (corn) 21 lbs. daily.

Pounds of Roots: Carrots, 7 lbs. daily.

The cow was fed six times daily, had a persistent appetite, and showed little diminution of milk during the severe weather, but the depth of the cream was much reduced.

(Signed) MASON C. WELD.

BUTTER TESTS.

"Cows are my passion. What I have ever sighed for has been to retreat to a [dairy] farm, and live entirely surrounded by cows."—*Dickens.*

FOR ONE YEAR.

		Yield. lbs.	oz.	Age. Yrs.
1885-6	1 year, **LANDSEER'S FANCY** 2876	936	14¾	12
1883-4	1 year, Mary Anne of St. Lambert 9770	867	14¾	4
1881	1 year, Jersey Queen of Barnet ——	851	1	6
1879-80	1 year, Eurotas 2454	778	1	8
1877-8	1 year, Jersey Belle of Scituate 7828	705	0	6
1880	1 year, Value 2d 6844	671	8	4
1883	1 year, Cora ——	580	6	2
1883	1 year, Pansy 1019	574	8	6
1853-54	1 year, Flora 113	511	2	4
	1 year, Abbie ——	486	0	6
1885	1 year, Lulu 4th ——	406	0	
	1 year, Webster Pet 4103	429	0½	

FOR LESS THAN ONE YEAR.

		lbs.	oz.	Yrs.
1884	304 days, Belle Steuben 20,115	450	8½	2
1884	247 days, Duchess of Bloomfield 3653	501	4	10
	236 days, Effie ——	507	8	
1881	227 days, Mollie Garfield 12,172	526	12	5
1885	207 days, Gold Lace 10,726	433	10	10
1885	151 days, **LANDSEER'S FANCY** 2876	479	2	
1885	145 days, Lady of Otsego 26,671	227	0	2
	138 days, Eva ——	281	0	
1885	120 days, **LANDSEER'S FANCY** 2876	392	3	12
	98 days, Goldthread 4015	204	7	
1884	90 days, Masena 25,732, end of year	152	2	8
1885	91 days, Little Torment 15,581	228	1½	3
1885	90 days, **LANDSEER'S FANCY** 2876	302	15	12
1879	70 days, Maud Lee 2416	212	0	9
1882	62 days, Bomba 10,330	174	0	4
1884	62 days, Roonan 5133	160	8	8½
1883	62 days, Fair Lady 6723	150	4½	7
1875	61 days, Lady Mel 2d 1795	183	0	5
1885	60 days, **LANDSEER'S FANCY** 2876	205	9	12
1884	56 days, Little Torment 15,581	83	5	2
1881	35 days, Valma Hoffman 4500	105	3	7

FOR THIRTY-ONE DAYS.

		Yield. lbs.	oz.	Age. Yrs.
1883	31 days, Mary Anne of St. Lambert 9770	106	12½	4
1883	31 days, Nancy Lee 7618	95	3½	7
1882	31 days, Bomba 10,330	89	14	4
1883	31 days, Jennette Montgomery 5177	89	0	9
1884	31 days, Thorndale Belle 3d 10,459	89	0	6
1884	31 days, Hilda A. 2d 11,120	86	4½	4
1884	31 days, Hazen's Nora 4791	84	5	9
1884	31 days, Roonan 5133	86	4½	8½
1881	31 days, Jersey Queen of Barnet ——	84	5	
1885	31 days, Dora Neptune 20,318	83	6½	4
1881	31 days, Mollie Garfield 12,172	82	0	5
1883	31 days, Oakland's Cora 18,853	81	5½	6
1884	31 days, Siloam 17,623	77	2¾	3
1885	31 days, Pet of Rose Lawn 11,326	75	15	5
1885	31 days, Gold Lace 10,726	75	0	10
1884	31 days, Daisy Brown 12,213	73	4½	3
1882	31 days, Colt's La Biche 6399	73	2	5
1874	31 days, Couch's Lily 3237	71	0	5
1885	31 days, Signal Maid 19,361	65	11	2
1883	31 days, Cora ——	64	1	2
	31 days, Oak Leaf 4769	63	4	
1885	31 days, Sunset of Pleasant View 13,071	61	13	6
1884	31 days, Rosebud of Bellevue 7702	60	4½	6
	31 days, Robema 3840	54	0	2

FOR THIRTY DAYS.

		lbs.	oz.	Yrs.
1885	30 days, **LANDSEER'S FANCY** 2876	111	15½	12
	30 days, Effie ——	98	0	
1880	30 days, Eurotas 2454	88	0	8
1881	30 days, Valma Hoffman 4500	87	9	7
	30 days, Queen Victoria ——	80	0	
1885	30 days, Princess Imperial 11,620	76	13	6
	30 days, Jersey Cream 3151	71	4	
1885	30 days, Baronetti 8425	68	7	6
1885	30 days, Signal Maid 19,361	65	11	2
	30 days, Abbie Z. 14,002	61	2	6
	30 days, Maple Dale 2907	60	0	4
1884	30 days, Belle Steuben 20,115	56	4	2

FOR FOUR WEEKS.

		Yield. lbs.	oz.	Age. Yrs.
1884	28 days, Princess 2d 8046	107	3	6
1884	28 days, Fairy Queen of St. Brelades 7464	73	14¼	9
1885	28 days, Fan's Grouville Beauty 10,079	72	5	3
1885	28 days, Lady Fawn of St. Anne's 10,920	64	6½	15
1884	28 days, Pride of Bovina 8050	64	0	7
1885	28 days, Lady Fair 22,103	56	12	2

FOR THREE WEEKS.

1885	21 days, Cherokee Rose 20,921	61	2	
1884	21 days, Maggie Rex 28,623	47	8½	4

FOR TWO WEEKS.

1884	15 days, King's Trust 18,946	36	6¼	
1885	14 days, Grace Davy 8292	44	2½	9
1884	14 days, Viva Le Brocq 13,702	33	13	
1882	14 days, Valhalla 5300	34	0	6
1884	14 days, Chamomilla 7552	30	11	6
	14 days, Letitia 3977	30	7	
1886	14 days, La Financiere 11,970	29	7¼	8
1884	14 days, Pansy K. 23,889	29	2	2
1884	14 days, Guinevere Sinclair 11,167	28	10	4
	14 days, Jersey Rosalie ——	25	3	1

FOR LESS THAN TWO WEEKS.

1885	13 days, Khelula 17,970	37	8	5
1885	10½ days, Optima 6715	30	15½	8
1878	10 days, Lady Oxford 4860	22	2	4
1885	10 days, Eugenie Tourneur 24,532	21	12½	6
1879	10 days, Miss Blanche 25,157	20	9	8
	10 days, Birdie 2611	20	0	
1882	8 days, Lady of the Isles 2d 16,652	22	8	4
1883	8 days, Fair Lady 6723	21	5	6
1882	8 days, Lady Josephine 11,560	19	2	4

TESTS OF JERSEY COWS FOR SEVEN DAYS.

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
	GROUP FIRST: FORTY-SIX-POUND COWS.			
1885	**PRINCESS 2d** 8046	46	12½	8
	GROUP SECOND: THIRTY-NINE-POUND COWS.			
1885	**Oxford Kate** 13,646	39	12	6
	GROUP THIRD: THIRTY-SIX-POUND COWS.			
1884	**Mary Anne of St. Lambert** 9770	36	12¼	6
	GROUP FOURTH: THIRTY-ONE-POUND COWS.			
1885	Alice Jones 8225	31	13½	7
	GROUP FIFTH: THIRTY-POUND COWS.			
1885	**Ethleel 2d** 32,291	30	15	2
1884	**Ida of St. Lambert** 24,990	30	2½	6
	GROUP SIXTH: TWENTY-NINE-POUND COWS.			
1885 1883	**Landseer's Fancy** 2876	29 **21**	8 **15**	12
	GROUP SEVENTH: TWENTY-SEVEN-POUND COWS.			
1885	Mother Carey 11,746	27	1½	6
	GROUP EIGHTH: TWENTY-SIX-POUND COWS.			
1883	Nancy Lee 7618	26	8½	7
1885	Geranium 2d 7838	26	4¾	7
	GROUP NINTH: TWENTY-FIVE-POUND COWS.			
1884	**Mermaid of St. Lambert** 9771	25	13½	6
1885	Daisy Morrison 14,305	25	12½	4
1880	Jersey Belle of Scituate 7828	25	3	9
1883	**Value 2d** 6844	25	2 11/12	7
1885	Fillpail 2d 24,388	25	2	4
	GROUP TENTH: TWENTY-FOUR-POUND COWS.			
1885	Scituate of Woronoco 18,040	24	14	2
1883	Hazen's Bess 7329	24	11	7
1885	Lily Scituate 12,665	24	9½	4
1885	Westphalia 24,384	24	9½	5
1885	Eugenie Chouteau 6186	24	8	3
1885	Mother Hubbard 10,331	25	1½	6

	GROUP ELEVENTH: TWENTY-THREE-POUND COWS.	Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1885	Flower of Glen Rouge 17,560	23	14¾	3
1885	Cherokee Rose 20,921	23	10	3
1884	Beauty of the Grange 7502	23	9	8
1885	Lady Panalphrex 17,400	23	9	3
1885	Fame 17,424	23	6	6
1884	Hilda 2d 5447	23	5	9
1885	Oaklands Nora 14,880	23	5	4
1885	Little Torment 15,581	23	2½	3
1885	Sue Gallagher 15,945	23	1½	4
1885	Moss Rose of Willow Farm 5194	23	1	12
1879	Maud Lee 2416	23	0	9
	Naomie ——	23	0	6

GROUP TWELFTH: TWENTY-TWO-POUND COWS.

1884	Sweetbrier of St. Lambert 5481	22	12	8
1882	Mollie Garfield 12,172	22	12	7
1885	Niobe's Alpheanette 23,336	22	10½	3
1884	Ona 7840	22	10½	7
	Effie ——	22	10	
1884	Fadette of Verna 3d 11,122	22	8½	3
1881	Eurotas 2454	22	7	8
1885	Attractive Maid 16,925	22	5	5
1885	Grace Davy 8292	22	5½	9
1885	Queen Mary of Woodlawn 11,659	22	5	6
1882	Oonan 1485	22	2½	11
1884	**Naiad of St. Lambert** 12,965	22	2¼	5
1885	Beulah de Gruchy 13,480	22		5
1881	Tenella 6712	22	1½	4
1885	Nora of St. Lambert 12,962	22	0	5
1884	Cora of Linwood 12,915	22	0	3

GROUP THIRTEENTH: TWENTY-ONE-POUND COWS.

1882	**Bomba** 10,330	21	11½	4
1881	Croton Maid 5305	21	11½	5
1884	Phlox 16,399	21	11	7
1882	Pearl Armstrong 2670	21	10	10
1885	Primrose 11,956	21	10	9

GROUP THIRTEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1885	**Matilda 4th** 12,816	21	8½	5
1885	Optima 6715	21	8½	7
1885	**Mamelle** 20,804	21	8¼	2
1883	Jenny Dodo II. 14,448	21	8	5
1884	**Niobe of St. Lambert** 12,969	21	4½	4
1884	Reception 8557	21	4½	9
1885	Rose of St. Lambert 20,426	21	3½	4
1885	Atlanta's Beauty 12,949	21	3	3
1884	Island Star 11,876	21	3	5
1885	**Hilda D.** 6683	21	2½	8
1884	Gold Lace 10,726	21	1	10
1881	Valma Hoffman 4500	21	0	7
1884	Handsome Myra 14,244	21	0	4
1875	Lady Mel 2d 1795	21	0	7
1885	Gem of Hope 17,102	21	0	4
1881	Nelly 6546	21	0	9

GROUP FOURTEENTH: TWENTY-POUND COWS.

		lbs.	oz.	Age. Yrs.
	Beauty ——	20	15	
1882	Mary M. Allison 6308	20	14	5
1885	Alberta Signal 18,611	20	11	3
1882	Pride of Eastwood ——	20	11	
1883	Chrome Skin 7881	20	10	5
1885	Cassia 2d 21,370	20	10¼	9
1885	Celeste Cox 12,948	20	8	4
1885	Brenda of Elmhurst 10,762	20	8	7
1884	Masena 25,732	20	7	9
1883	Chroma 4572	20	6	8
1883	Daisy of St. Peter's 18,175	20	5½	6
1884	Honeymoon of St. Lambert 11,221	20	5¼	5
1885	Calendine 9415	20	5	7
1884	Hazen's Nora 4791	20	4	9
1885	Nan Day 17,192	20	4	3
1884	Roonan 5133	20	4	8
1884	Fairy of Verna 2d 10,973	20	3¾	4
1885	Camelia 2d 11,188	20	3	6
1885	Pilot's Veronica 18,917	20	2	6

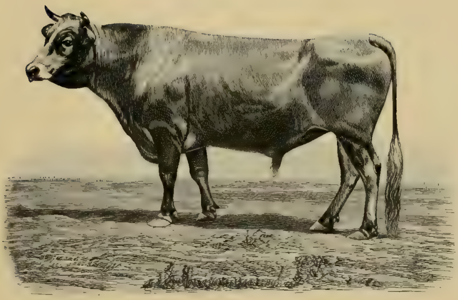
GROUP FOURTEENTH.

(Continued.)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1885	Rose of Eden 13,437	20	1½	7
1883	Meines 3d 7741	20	1	6
1885	Lalla Rookh of Sugar Grove 15,882	20	1	4
1885	Maquilla 24,043	20	1	
1882	Duchess of Bloomfield 3653	20	0½	8
1883	Jennette Montgomery 5177	20	0	9
1884	Dora Neptune 20,318	20	0	3
1885	Hillside Gem 16,640	20	0	4
	Lady Conover 2d 17,589	20	0	
1884	Hilda A. 2d 11,120	20	0	4
1872	Pansy 1019 (rated by year's test)	20	0	6

GROUP FIFTEENTH: NINETEEN-POUND COWS.

		lbs.	oz.	Yrs.
1884	**Rioter Pink of Berlin** 23,665	19	14	3
1885	Ethleel 18,724	19	14	5
1885	Hypathia 2d 14,774	19	13½	3
1882	Phaedra 2561	19	13	9
1884	Gardiner's Ripple 11,693	19	12½	5
1885	Lille Bonne 8108	19	12	9
1884	Hulla 7898	19	12	6
1883	Rosebud of Allerton 6352	19	12	6
1885	Quachette 17,091	19	11½	3
	Ianthe 4562	19	11	
1882	Mink 2d 3890	19	11	7
1882	Lady of the Isles 2d 16,652 (rated)	19	11	4
1885	**Evelina of Verna** 10,971	19	10½	5
1883	Oaklands Cora 18,853	19	9½	5
1885	Rozel Lass 20,268	19	9½	5
1885	Maggie McM. 14,073	19	9	4
1885	The Widow's Daughter 11,507	19	8½	4
1885	Summerline 8001	19	8	6
1885	**Khelula** 17,970	19	8	5
1886		**14**	**6½**	
1885	Fairy Queen of St. Brelades 7464	19	7½	9
1882	Countess of Lakeside 12,135	19	7	14
1883	Christmas Nannie 4075	19	7	9
1883	Brighteyes 2d 2290	19	6	12



LILLE BONNE'S SON 4418.

AT 3 YEARS OLD.

Lille Bonne—Favorite of the Elms Type.

BILLINGS HERD.

FREDERICK BILLINGS, WOODSTOCK, VERMONT.

GROUP FIFTEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1882	Bertha Morgan 4770	19	6	9
1882	Alluring 5541	19	5	5
1884	Cherry 3d ——	19	4½	
1885	Well Done 25,987	19	4	3
1880	Jersey Queen of Barnet ——	19	4	
1885	Valentine of Trinity 7460	19	4	7
1883	Dot of Bear Lake 6170	19	4	6
1885	Fan's Grouville Beauty 10,079	19	3	3
1883	Roland's Bonnie 2d 18,054	19	2	4
1882	Beauty of Jersey 7850	19	2	6
1882	Thisbe 2d 2201	19	1½	10
1882	Magna 2238	19	1	14
	Pussie 3035	19	1	
1883	**Fair Lady** 6723	19	1	6
1885	Rosy Dream 9808	19	1	6
1882	Rissa 16,014	19	0	5
	Queen Victoria ——	19	0	
1885	Belle of Prospect 2d 14,326	19	0	5
1885	Belle of Ingleside ——	19	0	

GROUP SIXTEENTH: EIGHTEEN-POUND COWS.

		lbs.	oz.	Yrs.
1886	Œnone 8614	18	15	7
1882	Countess Potoka 7496	18	15	4
1885	Princess Imperial 11,620	18	15	6
1885	Queen Neptune 15,501	18	13½	5
1882	Queen of Delaware 17,029	18	13	4
1884	Tenella 2d 19,521	18	12	4
1883	Belmeda 6229	18	12	6
1880	Maggie Mitchell ——	18	12	
1882	Lady Gray of Hilltop 6850	18	12	7
1884	Peggy Leah 3097	18	12	11
1884	Rosy Kate 10,276	18	12	8
1883	May Blossom 5657	18	11	6
1883	Bet Arlington 8970	18	11	5
	Dolly ——	18	11	
1885	**Percie** 14,937	18 **14**	10 **6½**	4

	GROUP SIXTEENTH. (*Continued.*)	Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1884	Siloam 17,623	18	10	3
1884	Beauty Romeru 26,090	18	9	4
1882	Belle Grinnell 4073	18	8	7
1885	Rosy Kate's Rex 13,192	18	8	5
1883	Floribundus 2d 14,949	18	8	4
1884	Nymphæa 5141	18	7½	9
1882	Rosa of Bellevue 6954	18	7½	6
1884	Leoni 11,868	18	7	4
1885	Rioter's Maggie 22,530	18	6½	2
1883	Pyrola 4566	18	6	7
1883	Eveline of Jersey 6781	18	6	5
1884	Kitty Potter 9893	18	5	5
1886	Signetilia 16,333	18	5½	4
1884	Butter Star 7799	18	4½	6
1884	Colie 8309	18	4	7
1885	Harmony 2d 7118	18	3	5
1884	Countess Queen 13,519	18	3	3
1885	Viva Le Brocq 13,702	18	3	4
1884	Lady Appel 8612	18	3	7
	Panatilla 4778	18	3	
	Jennie ——	18	3	
1884	Belle Dawson 8270	18	3	6
1884	**Pet of Rose Lawn** 11,326	18	2½	4
1885		**15**	**8½**	5
1881	Gold Ear 2d 3592	18	2	7
1885	Lucy Lanier 13,053	18	2	4
1882	Blue Belle of Maple Grove 10,687	18	2	3
1883	Bonnie Yost 7943	18	2	4
1885	Signaldella 24,107	18	1¾	2
1885	Abbie Clay 15,702	18	1	4
1883	Volie 19,465	18	1	6
1885	Belle Mardi 18,362	18	0¾	6
	Lady Essex 4749	18	0¾	
1883	Melia Ann 5444	18	0½	8
1884	Medrena 3939	18	0	9
1883	Ida Bashan 4725	18	0	7
1884	King's Trust 18,946	18	0	3
	Amy 395	18	0	

GROUP SIXTEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
	Patterson's Beauty 4760	18	0	
	Conover's Beauty 12,650	18	0	
	Lady Ives 1708	18	0	
1883	Belle of Scituate 7977	18	0	8
	Amethyst 2699	18	0	
1884	***Le Brocq's Curfew*** 30,697	18 / ***15***	0 / ***12½***	4
	Pansy of Bellewood 2d 8904	18	0	
	Monmouth Duchess 4th 7129	18	0	

GROUP SEVENTEENTH: SEVENTEEN-POUND COWS.

		lbs.	oz.	Age.
	White Clover Leaf 4512	17	15	
1883	**Su Lu** 4705	17	15	6
1885	Bell of Lynwood 18,364	17	14	3
1885	Mary Norton 13,052	17	14	5
1883	**Lydia Darrach** 4903	17	14	7
1883	Mirtha 3437	17	13½	8
1883	Mirth's Blanche 19,572	17	13½	6
1884	Crocus of St. Lambert 8351	17	12	6
1884	Cowslip of St. Lambert 8349	17	12	6
1881	Royal Princess 2370	17	12	7
1884	Royal Princess 2d 12,346	17	12	6
1885	Arthur's Mistletoe 11,968	17	11½	4
1884	Matin 7768	17	11	9
	Jersey Rosalie ——	17	10	
1884	Fear Not 6059	17	10	9
1884	Dora Bell of Shelly's Island 9394	17	10	5
1885	Marea 10,167	17	10	5
1881	Rosaline of Glenmore 3179	17	10	8
1885	Lady Thurlow 12,410	17	10	5
1882	Empress 6th 3203	17	9¾	8
1885	Nancy Lovelock 15,511	17	9	4
	Oak Leaf 4769	17	9	
1883	Cordelia Baker 8814	17	9	5
1881	Metah's Queen 4886	17	9	5
1885	Milky Way 18,865	17	8½	6

	GROUP SEVENTEENTH. (*Continued.*)	Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1884	St. Jeannaise 15,789	17	8½	4
1884	Zitella 2d 11,922	17	8½	3
1884	Countess Lowndes 26,874	17	8	2
1884	Maud Melinda 12,126	17	8	5
	Lara 4306	17	8	
	Reckless 3569	17	8	
1885	Queen of Nubbin Ridge 14,528	17	8	
	Violet 272	17	8	
1885	Gabrielle Champion 14,102	17	8	4
1884	Kaoli 18,980	17	8	8
1882	Welma 5942	17	8	5
1881	Cerita of Meadow Brook 5056	17	8	5
	Gipsy May 6259	17	8	
	Maggie 3d 3221	17	8	
	Io 5th 280	17	8	13
1878	Mamie Coburn 3798	17	8	4
1881	Embla 4799	17	8	6
1885	Olymph 17,957	17	8	5
	Hepsy 2d 12,008	17	8	
1885	Brunette of Scarsdale 13,276	17	8	4
1884	Jennie of the Vale 9553	17	7½	5
1883	Fair Starlight 7745	17	7½	6
1883	Rosa Miller 4333	17	7	9
1884 1882	**Cottage Lass** 5332	17 **14**	7 **8**	8
1883	Torfrida 3596	17	6½	9
1884	Daisy Brown 12,213	17	6½	3
1885	**Tette** 20,802	17	6	2
1883	Vixen 7591	17	6	5½
1885	Floret 9959	17	6	6
1885	Toltec's Fancy 27,172	17	6	2
1883	Faultless 12,018	17	5½	8
1884	Queensborough 24,345 (Jersey)	17	5	10
1883	Judith Coleman 13,191	17	5	2
1885	Richness 16,536	17	5	4
1883	Florinanna 24,354 (Jersey)	17	5	7
1885	Pandothro 22,383	17	5	2
1882	Renalba 4117	17	5	6

GROUP SEVENTEENTH.

(Continued.)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
	Beeswax 9807	17	5	
1883	Minnette of St. Lambert 9774	17	4	4
1883	Faith of Oaklands 19,696	17	4	7
1882	Oktibbeha Duchess 4422	17	4	7
1885	Obella B. 10,575	17	4	6
1875	Wybie 595	17	4	9
1885	Chloe 4th 4612	17	4	10
1883	Mhoon Lady 6560	17	3	5
1882	Princess Mostar 9700	17	3	5
1885	Frugal 14,925	17	2¾	9
1882	Colt's La Biche 6399	17	2½	5
1885	Cetewayo's Silver Bell 18,952	17	2½	4
1881	Cream of Sidney 17,028	17	2½	5
1885	Gold Trinket 9518	17	2	6
1883	Gipsy 5th 2252	17	2	13
1885	Bellita 4553	17	2	9
1884	Lady Velvetine 15,771	17	2	5
1885	Rupertina 10,409	17	1½	5
1884	Lactine 10,680	17	1½	4
1879	Cyrene 4th 480	17	1	8
1885	Mousy 2d 14,962	17	1	6
1884	Countess Micawber 1759	17	1	12
1884	Lucilla 3d 9786	17	1	4
1884	Maggie Rex 28,623	17	0½	4
1882	Valhalla 5300	17	0	6
	Jenny 287	17	0	
1884	Julia Anna 16,463	17	0	2
1853	Rose 240	17	0	
1882	Matilda 3238	17	0	
1885	Katie Bashford 15,982	17	0	
	Fairy 10	17	0	
1881	Jersey Cream 3151	17	0	7
1880	Young Fanny 9032	17	0	3
1883	Abbie Z. 3d 14,742	17	0	4
1885	Lily Darling 11,713	17	0	7
	Butter Prize——	17	0	
1885	Plum 13,228	17	0	4
1885	Bertha Black 26,275	17	0	5

	GROUP EIGHTEENTH: SIXTEEN-POUND COWS.	Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1885	Herberta 8811	16	15	6
1884	Lizzie D. 10,408	16	15	4
	Polly Clover 7052	16	15	
1883	Maudine of Elmwood 8718	16	15	4
1882	Effie of Hillside 1521	16	15	11
	Creole Maid 11,017	16	15	
1885	Maid of the Elms 18,932	16	14½	5
1883	Pyrrha 6100	16	14½	6
1885	Grace's Nightingale 19,855	16	14½	4
1885	Nightingale K. 2d 19,841	16	14½	
1885	Trust 23,642	16	14	5
1884	Chrissy 2d 7720	16	14	6
1885	Baronetti 8425	16	14	7
	Silver Rose 4753	16	14	
1885	Lulu 2d ——	16	14	7
1883	Almah of Oakland 11,102	16	14	3
1882	Lucky Belle 2d 6037	16	14	5
	Joan d'Arc 2162	16	13½	
1883	Armon 10,863	16	13½	3
1884	Ceccola 13,608	16	13	4
	Miss Browny 7288	16	13	
1885	Lady Fawn of St. Anne's 10,920	16	12½	15
1884	Pauline's Vivienne 11,305	16	13	5
1884	Katie Kohlman 7270	16	12	7
1884	Princess of Ashantee 13,467	16	12	5
	Lady Josephine 11,560	16	11	
1884	Typha 5870	16	11	7
	Kitty 5th 3849	16	11	
1875	Dimple 3248	16	11	3
1878	Coomassie 11,874 (Jersey Test)	16	11	7
1885	Lass Rex Alphea 16,965	16	10¾	4
1884	Pierrot's Lady Bacon 12,482	16	10	6
1882	Grinnell Lass 11,859	16	10	2
1885	Countess Coomassie 19,339	16	10	4
1876	Dusky 2525	16	10	5
	Mabel of St. Mary's 8627	16	10	6
1882	Duenna's Duchess 5508	16	10	5
1883	Chamomilla 7552	16	10	4

GROUP EIGHTEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1884	Lady Cloud 19,358	16	10	2
1884	Ada S. 18,366	16	9	3
1883	Dandelion 2521	16	9	15
1881	Silveretta 6852	16	9	5
1881	Gold Thread 4945	16	9	4
1883	Pride of Bovina 8050	16	9	6
1883	Arawana Queen 5368	16	9	6
1874	Couch's Lily 3237	16	9	5
1886	La Petite Mère 3d 12,814	16	9	
1885	Sister Rex 13,194	16	8	4
	Linda 3d 3219	16	8	
1885	Golden Skin 10,861	16	8	6
1882	Diana of St. Lambert 6636	16	8	5
1885	Emma Hudson 12,469	16	8	5
1882	Daisy of Belhurst 3114	16	8	9
	Josephine 2d 3296	16	8	
1882	Lida Mullin 9198	16	8	2
	Patty Mc 3d 4754	16	8	
1880	Leonice 2d 8342	16	8	2
	Princess 1154	16	8	
	Palestine 3d 1104	16	8	
1878	Chrissy 1448	16	8	8
1884	Lady Love 2d 2212	16	8	12
1877	Lady Bowen 354	16	8	15
	Carrie 3894	16	8	
1885	Pet Clover 14,624	16	8	5
1879	Sultane 2d 11,373	16	8	4
1885	Empress of Ely 2d 6771	16	8	9
	Lucy 4877	16	8	
1884	Dudu of Linwood 8336	16	7½	5
1884	Milkmaid Felch 12,339	16	7½	4
1885	Kosi 3431	16	7	15
1882	Zithey 9184	16	7	3
1885	Rosona 12,956	16	7	4
1880	Gala 1375	16	7	11
1885	Lotchen 19,823	16	7	4
1883	May Fair 5184	16	7	7
1885	La Petite Mère 2d 12,810	16	7	6

GROUP EIGHTEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1884	Polynia 10,753	16	7	4
1885	Rioter Alphea 10,091	16	7	4
1884	Brunette Lass 1780	16	7	15
	Lady Warren 12,168	16	7	
1885	Gladys of Bellevue 9569	16	7	6
1886	Nancy Rex 11,743	16	7	6
	Ochra 2d 11,516	16	6½	
1884	Belle of Patterson 5664	16	6	5
1884	Moggie Bright 25,891	16	6	3
1884	Cill of Glen Rouge 13,818	16	6	2
1885	Granny's Gem 30,406	16	5¼	3
1885	**Carrie Lena 3d** 20,077	16	5	2
1881	Troth 6139	16	5	4
1885	Jersey Cream 3d 8521	16	5	6
1884	Lady Superior 22,865	16	5	6
1883	Olie's Lady Teazle 12,307	16	5	3
1883	Corinna 2d 6594	16	5	6
1883	Vieva 3d 7642	16	5	4
1879	Miss Vermont 7698	16	5	5
1879	Flora of St. Peter's 8622	16	5	3
1885	Flora Lee of Tennessee 7694	16	5	6
1884	Hattie Douglass 24,960	16	5	5
1883	Princess Sheila 7297	16	4½	5
1885	Brambaletta 10,451	16	4	6
1885	Matilda 5th 18,068	16	4	2
1883	Alfleda 6744	16	4	5
1885	Topaz of Woodlawn 11,661	16	4	5
1883	Miss Willie Jones 6918	16	4	7
1882	Busy Bee 6336	16	4	4
	Silvia Baker 8793	16	4	
1883	Daisy Queen 9619	16	4	5
1884	Patty of Deerfoot 15,321	16	4	10
	Tamy 2d 7125	16	4	
1883	Desire 24,360	16	4	4
1884	Rose of Rose Lawn 9365	16	3	6
1883	Blossie Reynolds 6082	16	3½	6
1885	Maritana 12,039	16	3½	5
1884	Lady Alice of Hillcrest 7450	16	3	6

GROUP EIGHTEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1885	Golden Zoe 3975	16	3	10
1882	Lily of Maple Grove 5079	16	3	5
1885	Young Garenne 3d 13,648	16	3	3
1880	Willis 2d 4461	16	3	5
1885	Lesbie 9179	16	3	8
1883	Maggie of St. Lambert 9776	16	3	4
1884	Alhena 15,995	16	3	6
1884	Gazella 3d 9355	16	3	5
1885	Sunset 15,130	16	2½	3
1885	Cetewayo's Dorcas 20,287	16	2¼	4
1884	Moth of St. Lambert 9775	16	2	5
1885	Eudora 1863	16	2	18
1882	La Vivienne 2d 1324	16	2	12
1885	White Frost 17,431	16	2	5
1882	Fear Not 2d 6061	16	2	6
	Susie Marshall 5782	16	2	
1883	Corn 10,504	16	2	3
	Tamy Lowndes 25,316	16	2	
1882	Callie Nan 7959	16	2	4
1885	Lady Cecilia 24,821	16	1	6
1882	Warren's Duchess 4622	16	1	8
1885	May Lankton 15,872	16	1½	7
1880	Maid of Amboy 2929	16	1	7
	Les Cateaux 2d 15,538	16	1	
	Ariene 1071	16	0	
	Victoria 3175	16	1	
1884	Alcmena 6193	16	1	6
1885	**Euphonia** 6783	16	0½	7
1882	Marjoram 3239	16	0	9
1884	Pierrot's Picture 12,481	16	0	6
1883	Urbana 5597	16	0	6
	Tamy 3d 7127	16	0	
1883	Bessie R. 13,503	16	0	2
	Rose 3d 913	16	0	
	Blanche 594	16	0	
1883	Wakena 19,721	16	0	3
	Molly Brown 7861	16	0	
	Tilda 3720	16	0	

GROUP EIGHTEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1884	Cream of Java 23,507	16	0	5
1883	Dairy Pride 4th 21,681	16	0	4
1885	Thaley 14,299	16	0	2
1885	Ruby Wray ——	16	0	2
	Pride of Corisande 5323	16	0	
	Countess 114	16	0	
	Bessie S. 5002	16	0	
1881	Ida of Bear Lake 6169	16	0	5
	Nellie Maitland 4450	16	0	
	Ibex 2724	16	0	
1881	Dom Pedro's Julian 8631	16	0	4
	Lady Penn 5314	16	0	
	Rose 2d 239	16	0	
	Victorine La Chaise 2740	16	0	
1883	Fayette Lady 14,473	16	0	3
1877	Maple Dale 2907	16	0	4
1884	Merlette 4988	16	0	6
	Margery Lee 5425	16	0	
1882	Enfield Rose 3355	16	0	12
	Haddie 921	16	0	
	Molly 3554	16	0	
	Minnie of Oxford 12,806	16	0	
1885	Princess of Trinity 23,641	16	0	6
1883	Troth Plight 10,258	16	0	4
	Gray Therese 5322	16	0	
	Arawana Belle 3277	16	0	
1885	Fleurette of Linwood 12,918	16	0	4
1884	Dahlia ——	16	0	
1885	Lydia Darrach 2d 8056	16	0	7
1885	Lydia Darrach 3d 10,662	16	0	6

GROUP NINETEENTH: FIFTEEN-POUND COWS.

		lbs.	oz.	Yrs.
1883	Julia Evelyn 6007	15	15½	6
1884	Pansy Patterson 18,612	15	15	2
	Minneola of Elmarch 8229	15	15	
1883	Brunette Le Gros 9755	15	15	7
1883	Kate Gordon 8387	15	15	4

GROUP NINETEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1884	Thorndale Belle 3d 10,459	15	15	6
1884	Oitz 8649	15	15	6
1884	Zoe Henry 6693	15	14¾	9
1884	Rose of Oxford 13,469	15	14½	5
1884	Idaletta 11,843	15	14½	5
1883	Lass of Scituate 9555	15	14	5
1885	Mary of Bear Lake 6171	15	14	9
	Nelly 2402	15	14	
1884	Romp Ogden 3d 5458	15	14	7
1884	Belle of Vermilion 8798	15	14	6
	Avis E. 9714	15	14	
1885	Lady Alice of the Wilderness 12,207	15	14	7
1884	Mollie Garfield 2d 18,662	15	14	4
1884	Golden Princess 4557	15	14	8
1885	Glory of Elmarch 21,521	15	13½	3
1883	Jolie of St. Lambert 5126	15	13½	8
1874	Lucy Gray 2746	15	13	3
1885	Dia 13,658	15	13	6
1882	Tobira 8400	15	13	3
1884	Duchess of St. Lambert 5111	15	13	9
	Magna 5th 3541	15	13	
1883	Lily of Burr Oaks 11,001	15	13	3
1881	Edwina 6713	15	13	4
1884	Petite Mère 8516	15	13	6
1882	Valerie 6044	15	13	5
1885	Nutley Silverette 22,410	15	12¾	3
1883	Lady Bidwell 10,303	15	12	4
1885	Ultima 14,456	15	12	5
1885	Eclipse 14,427	15	12	6
1885	Lucy Dale 5129	15	12	12
1880	Lerna 3634	15	12	6
	Cornucopia 3414	15	12	
1883	St. Clementaise 18,163	15	12	3
1884	Rosabel Hudson 5704	15	12	8
	Thisbe 607	15	12	
1884	Pierrot's Lady Hayes 11,672	15	12	7
1883	Fanny Taylor 6714	15	12	5
1884	Lady Hayes 10,136	15	12	7

GROUP NINETEENTH.

(Continued.)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1884	Minnie 2386	15	12	8
1884	Julia Walker 10,133	15	12	5
	Cascadilla 3103	15	12	
1875	Myrtle 2d 211	15	12	6
	Countess of Croton 5307	15	12	
1885	Mary Hinman 17,619	15	11½	3
1883	Lady of Bellevue 7705	15	11	5
1883	Countess Gasela 9571	15	11	4
1884	Geneva 13,220	15	11	4
1884	Mitten 13,368	15	11	4
1884	Fillpail 16,530	15	11	2
1885	Farmer's Floss 17,773	15	11	3
1883	Princess Bellworth 6801	15	10½	5
1884	Malope 2d 11,923	15	10	4
1884	Calington 22,021	15	10	7
1885	Lisetta Johnson 5321	15	10	9
1885	Rochelle 15,574	15	10	4
1883	Fancy Juno 6086	15	10	6
1883	Lucilla Kent 8892	15	10	7
1883	Silenta 17,685	15	10	6
1884	Lady Kingscote 26,085	15	10	6
1882	Chenda 4599	15	9½	6
1883	Vaniah 6597	15	9½	8
1883	Kitty Colt 2213	15	9½	11
1884	Rioter's Nora 21,778	15	9	3
1884	Denise 8281	15	9	5
1885	Carrie Pogis 22,568	15	9	5
	Helen 3556	15	9	
1885	Calista of Newark 13,296	15	9	5
1884	Moss Rose of St. Lambert 5114	15	8½	9
1883	Idalene 11,841	15	8½	5
1876	Lustre 2062	15	8½	4
1885	Referette 15,209	15	8	4
1884	Black Diamond's Queen 11,865	15	8	5
1885	Les Marais Dell 20,314	15	8	4
1881	La Belle Petite 5472	15	8	5
1885	Marie C. Magnet 22,903	15	8	2
	Lady Oxford 4860	15	8	

	GROUP NINETEENTH. (*Continued.*)	Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1885	Mrs. Knickerbocker 19,367	15	8	6
	Sylvia 687	15	8	
1885	Pinafore 2d 15,072	15	8	3
1884	Happy Blossom 18,218	15	8	3
1883	Duchess Caroline 3d 6039	15	8	6
1880	Niva 7523	15	8	4
1883	Daisy 2d 15,761	15	8	7
1883	Palestina 4644	15	8	8
	Young Duchess 497	15	8	
	Etiquette 4300	15	8	
1882	Violet 3d 3240	15	8	10
	Jeanne Le Bas 2476	15	8	
1882	My Queen 12,614	15	8	
	Forget-Me-Not 5809	15	8	
1883	Grandiflora 9953	15	8	
1886	Safety 13,463	15	8	7
1885	Beauty 2076	15	7	16
1883	Orphean 4636	15	7	8
	Topsy Roxbury 7796	15	7	
1878	Copper 1979	15	7	8
1883	Crust 4775	15	7	6
1884	Roselaine 7167	15	7	6
1884	Marie S. 12,043	15	6	3
1882	Jersey 3260	15	6	18
1885	Moonah's Pet 7484	15	6	9
1882	Anna Smith 10,324	15	6	9
1885	Mendota 3d 26,326	15	6	10
1884	Fantine 1271	15	6	14
1880	Enigma 5360	15	6	6
1886	La Financiere 11,970	15	5¼	8
1884	Leah Darlington 13,836	15	5½	3
1882	Witch Hazel 4th 6131	15	5½	5
1884	Champion's Chloe 12,255	15	5½	6
	Belle of Middlefield 1516	15	5	
1884	Dairy 2d 3891	15	5	9
1882	Almeda 3842	15	5	11
1884	Letitia 3977	15	5	10
1882	Romp Ogden 2d 4764	15	5	6

GROUP NINETEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1883	Zalma 8778	15	5	4
1881	Arawana Buttercup 6052	15	5	4
1884	Calypris 5943	15	4½	7
1884	Mary's Silver Drop 14,235	15	4½	3
1883	Victory 16,379	15	4½	5
1882	Cenie Wallace 2d 6557	15	4½	4
1883	Dorothy of Bovina 9373	15	4	5
1883	Forget-Me-Not-O 10,564	15	4	3
1883	Maid of Five Oaks 7178	15	4	7
1884	Cora ——	15	4	
1883	Merry Burlington 7600	15	4	5
1883	Purest 13,730	15	4	2
1884	Jewel 3d ——	15	4	
	Cowslip 5th 849	15	4	
1885	Elsie Lane 13,302	15	4	4
1885	Evri 5282	15	4	9
1884	Baron's Rosette 25,988	15	4	2
1884	Signalana 7719	15	4	6
1884	Sultana 2d 11,798	15	4	5
1885	La Fantine 24,489	15	4	2
1885	Calpurnia 13,267	15	3½	4
1884	Reality 16,537	15	3½	3
1883	Nazli 10,327	15	3½	4
1884	Clytemnestra 2455	15	3½	12
1883	Dark Cloud 9364	15	3½	6
1884	Maggie Sheldon 23,583	15	3½	2
1884	Dove Dee 18,059	15	3	2
1885	Phœbe N. 25,401	15	3	5
1883	Royal Princess 22,013 (Jersey)	15	3	9
1884	Alfritha 13,673	15	3	3
1883	Lydia Libby 11,698	15	3	4
1885	Darling of Neatham 20,086	15	3	2
1884	May Day Stoke Pogis 28,353	15	3	4
1883	Lady Adams 2d 6529	15	3	5
1882	Atricia 6029	15	3	5
1884	Fragrance 4059	15	3	11
1883	Nellie Darlington 5956	15	3	11
1882	Belle Dame 2d 22,043	15	3	3

GROUP NINETEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1885	Maculac 24,277	15	3	2
1886	Belle Garner 23,862	15	3	
1882	Nelida 2d 8227	15	2½	3
1885	Eugenie Tourneur 24,532 (rated)	15	2½	6
1882	Iola 4627	15	2½	7
1885	Royal Beauty 18,908	15	2½	6
1884	Usilda 2d 6157	15	2½	7
1885	Fannie Bugler 19,962	15	2	4
1882	Saragossa 22,019 (Jersey)	15	2	5
1885	Cicero's Mabel 18,238	15	2	3
1883	Arawana Poppy 6053	15	2	5
1883	Fan of Grouville 7458	15	2	8
1883	Pet of Maplewood Farm 4854	15	2	9
1883	Bessie Bradford 2d 7271	15	2	6
1881	Lady Oaks 2d 5246	15	2	6
1883	Queen of Ashantee 14,554	15	2	4
1883	Naomi's Pride 16,745	15	2	3
	Daisy's Daughter ——	15	2	
	Azelda 2d 7022	15	2	4
1883	Princess of Mansfield 8070	15	2	8
1885	Sunset of Pleasant View 13,071	15	2	6
1883	Aleph Judea 11,389	15	1¾	3
1884	Lassie 1134	15	1½	15
1884	Verora 10,766	15	1½	4
1884	Coquette of Glen Rouge 17,559	15	1½	3
1882	Aldarine 5301	15	1½	6
1884	Bellini's Maid 15,170	15	1½	3
1884	Kate Pansy 15,177	15	1	4
1885	Nerissa of Nyack 9692	15	1	5
1884	Bronze Leaf 14,902	15	1	4
1884	Prize Rose 16,309	15	1	2
1884	Marvel 13,734	15	1	2
1884	Daisy Dixie 9469	15	1	6
1885	Duchess of Bloomfield 3d 15,580	15	1	3
1883	Dairy C. 12,227	15	0½	2
1885	Arnold's Lulu 7328	15	0	8
1884	Clara of Lakeside 10,827	15	0	7
	Olie 4133	15	0	

GROUP NINETEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1885	Ampelis 5th 17,548	15	0	3
1884	Romping Lass 11,021	15	0	3
1885	Signal Maid 19,361	15	0	2
1882	Forsaken 7520	15	0	4
1885	Favorite Rajah Rex 16,153	15	0	3
1883	Maid of Avranches 6559	15	0	7
	Picture 1533	15	0	
1883	Beauty 17,414	15	0	5
1885	Mintha 12,812	15	0	5
	Arietta 5115	15	0	
1885	Jennie Williams 29,058	15	0	2
1885	Dora Doon 12,909	15	0	3
1876	Mischief Le Brocq 7680	15	0	5
1885	Winsome of Ipswich 9213	15	0	6
1884	Annie Grey 11,712	15	0	7
1883	Lady Louise 4339	15	0	8
1885	Ethelka 2d 14,128	15	0	4
	Hennie 3335	15	0	
1877	Oxalis 2d 15,631	15	0	5
1884	Ma Belle 4942	15	0	8
1882	Bettie Dixon 4527	15	0	6
1883	Verbena of Fernwood 9088	15	0	4
	Belle Hartford 2718	15	0	
1882	Arthur's Frolic 4438	15	0	13
1882	Grace Felch 8291	15	0	7
1882	Trudie 2d 4084	15	0	4
1881	Sister Dorothy 2607	15	0	10
	Rene Ogden 1568	15	0	
1885	Lady Jane of St. Peter's 7475	15	0	7
	Duchess of Dudley 8670	15	0	
	Gledelia 10,524	15	0	
1878	Archie 1112	15	0	10
1878	Daisy Grant 1445	15	0	9
1884	Polly of Deerfoot 15,328	15	0	7
1880	Deerfoot Girl 15,329	15	0	2
1883	Marjoram 2d 12,805	15	0	3
	Heartsease 503	15	0	
	Hebe 3d 3613	15	0	

GROUP NINETEENTH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1885	Ida of Coal Hill 12,542	15	0	5
1885	Lydia Darrach 5th 16,577	15	0	4
	Earl Cow ——	15	0	

GROUP TWENTIETH: FOURTEEN-POUND COWS.

		lbs.	oz.	Age. Yrs.
1883	Satin Bird 16,380	14	15½	6
1885	Lady Bountiful 17,946	14	15½	7
1884	Miss Alexandre 26,041	14	15	5
1882	Miss Bell 5083	14	15	7
1883	Mary Clover 9998	14	15	6
1885	Molly May 17,202	14	15	4
1883	Sweet Sixteen 10,682	14	15	3
1884	Bellini La Biche 15,091	14	14½	3
1883	Miss Baden Baden 14,760	14	14½	3
1883	Faustine 10,354	14	14½	5
1885	Alice Herrick 8787	14	14	6
1881	Jenny Le Brocq 9757	14	14	4
1882	Gold Mark 10,727	14	14	2
1883	Florry Keep 6556	14	14	6
1883	Honeysuckle of St. Anne's 18,674	14	14	3
1884	Island Chrissie 12,007	14	14	5
1884	Fancy Fan 12,675	14	14	9
1885	Countess of Lorne 20,822	14	14	
1885	Frances C. Magnet 22,904	14	13½	2
1885	Arletta 3d 14,274	14	13½	5
1882	Velveteen 7703	14	13½	4
1885	Jefferson Albina 12,196	14	13	4
1882	Queen of De Soto 12,318	14	13	2
1883	Duchess of Argyle 3758	14	13	10
1883	Louvie 3d 6159	14	13	5
1884	Florence Billot 7849	14	13	8
1884	Oakland Girl 11,103	14	12½	4
1881	Lady Bloomfield 4704	14	12½	6
1883	Ideal 11,842	14	12½	3
1885	Ruby Love 16,915	14	12	4
1884	Alice of the Meadows 20,748	14	12	3
1885	Bright Lady 5938	14	12	8

GROUP TWENTIETH.

(*Continued.*)

		Butter Yield in Seven Days. lbs. oz.	Age. Yrs.
	Pet Lee 7993	14 12	
1884	Regina's Guide 16,862	14 12	4
1878	Katy Didn't 2734	14 12	7
1885	Goldstraw 3d 14,724	14 12	4
1877	Estrella 2831	14 12	5
1885	Pawtucket Belle 12,406	14 12	4
1878	Lady Brown 4th 6911	14 12	5
	Princess 836	14 12	
	Maple Leaf 4768	14 12	
1883	Cowles' Nonsuch 6199	14 12	7
1883	Lady Gray of Hilltop 2d 14,641	14 12	4
1883	Content of Linwood 6950	14 12	7
1883	Princess Bowen 9699	14 12	6
1883	Magnibel 7976	14 12	4
1882	Bloomfield Lady 6912	14 12	6
1882	Gold Princess 8809	14 12	3
1883	Phyllis of Hillcrest 9067	14 12	3
1883	Charmer 4771	14 12	7
1883	Roll of Honor 13,610	14 12	4
1882	Jersey Cream 2d 8519	14 12	5
1884 / 1886	**Cocotte** 11,958	14 12 / **14 6**	8 / 10
1883	Lady Fair 22,103	14 12	2
1886	Good Friday 20,081	14 12	4
1886	Inez of Ingleside 28,976	14 12	2
	Stanstead Belle 4709	14 11½	
1883	Sweetrock 2d 18,256	14 11½	4
1883	Bonnie 2d 5742	14 11½	6
	Bessie Ridgely 8293	14 11½	
	Bohemian Gipsy 17,452	14 11	
1876	Abbie Z. 14,002	14 11	6
1886	Clara C. Magnet 31,563	14 11	2
1885	Lizzette's Mary 12,723	14 11	5
1878	Maiden of Jersey 2736	14 11	8
1883	Royal Sister 12,457	14 11	3
1884	Belle Thorne 13,369	14 11	4
1885	Cosetta 15,991	14 11	7
1881	Renini 9181	14 10½	4

	GROUP TWENTIETH. (*Continued.*)	Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
	Cosette 3874	14	10½	
1883	Yellow Locust 10,679	14	10½	3
1884	Rosebud of Bellevue 7702	14	10½	6
1883	Opaline 7590	14	10	5
1885	Nimble 22,335	14	10	2
1884	Uinta 5743	14	10	7
1885	Sister Cash 33,987	14	10	2
1884	Trenie 17,770	14	10	2
1885	Bell Rex 11,700	14	10	4
1883	Lady Vertumnus 13,217	14	10	4
1884	Peggy Ford 21,713	14	10	2
1884	Reception 3d 11,025	14	10	4
1884	Euphorbia 11,229	14	9½	4
1884	Coronilla 8367	14	9½	5
1872	Jennie 766	14	9	6
1884	Guinevere Sinclair 11,167	14	9	4
1885	Clover Mel 16,159	14	9	3
1884	Auntybel 12,582	14	9	3
1882	Como Lass 24,369 (Jersey)	14	9	4
1884	Mountain Lass 12,921	14	9	5
1884	Pansy K. 23,889	14	9	2
1885	Maud Lee 2d 8839	14	9	7
1883	Mink 3d 4868	14	9	7
1883	Island Dots 17,003	14	9	1¾
1884	Miss Huelin 22,296	14	9	5
1885	L'Etoile du Nord 16,419	14	9	5
1884	Smoky 13,733	14	9	3
1885	Gem of St. Cloud 7342	14	8½	8
	Hattie 739	14	8	
1883	Regina 2d 2475	14	8	6
1853	Flora 113 (2½ months before 3d calf)	14	8	3
1882	Pavon 12,485	14	8	2
	Venus 112	14	8	
1885	Florie May Baker 10,728	14	8	5
	Princess Rose 6249	14	8	
1884	Dena of Deerfoot 15,325	14	8	7
	Deborana 4718	14	8	
1874	Alice of Salem 5053	14	8	4

GROUP TWENTIETH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1883	Goddess of Staatsburgh 5252	14	8	7
1883	Dolly of Lakeside 10,824	14	8	6
1883	Lady Ives 3d 6740	14	8	9
1883	Snowdrop F. W. 16,948	14	8	8
1881	Bryant 4193	14	8	6
1883	Hartwick Belle 7722	14	8	4
1873	Plenty 950	14	8	6
1882	New London Gipsey 11,667	14	8	6
1882	Caroline 12,019	14	8	6
1882	Fall Leaf 8587	14	8	3
1884	Del of Willow Farm 22,464	14	8	3
1874	Lorraine 1435	14	8	3
1880	Thorndale Belle 5265	14	8	6
1882	Pride of the Hill 4877	14	8	7
	Chloe Beach 3931	14	8	
1885	Tale Bearer 24,535	14	8	8
1883	La Pera 2d 13,404	14	8	3
1882	Enid 2d 10,783	14	7½	2
1885	Shiloh Daughter 20,378	14	7⅛	3
1882	Kosi 3431	14	7	12
1883	Florry of the Oaks 8141	14	7	6
1884	Milkweed 16,402	14	7	8
1884	Medrie Le Brocq 8888	14	7	5
1881	Aspirante 9272	14	7	4
1885	Lorella 12,913	14	7	4
	Corinne 707	14	7	
1884	Lena Lowndes 23,202	14	7	7
	Monmouth Duchess 3d 4620	14	7	
1882	Sunny Lass 6033	14	7	4
1884	Scipio's Lively 19,869	14	7	2
1883	Daisy of Chenango 18,582	14	7	5
	Audrey 1447	14	7	
1883	Nibbette 11,625	14	7	4
	Sal Soda 3721	14	7	
1876	Monmouth Duchess 3895	14	7	6
1882	Jessie Lee of Labyrinth 5290	14	7	4
1883	Epigæa 4631	14	7	3
1884	Belle of Uwchland 8468	14	7	

GROUP TWENTIETH.

(Continued.)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1885	Czaretta 17,358	14	7	3
	Meines 3559	14	7	
	Elsie Brown 4026	14	6½	
1884	Susie La Biche 3d 15,171	14	6½	3
1880	Beulah of Baltimore 3270	14	6½	7
1882	Allie Minka 2982	14	6½	8
1882	Irene of Short Hills 5137	14	6½	8
1885	Liberty 2d 16,717	14	6½	3
	Miss Blanche 2515 (rated)	14	6⅓	3
1885	Mary of Pleasant View 13,448	14	6	4
	Fides 2d 1576	14	6	
1883	Lobelia 2d 6650	14	6	8
1885	Ideal Alphea 18,755	14	6	2
1884	Maggie May 2d 12,926	14	6	4
1885	Pendule 2d 16,709	14	6	3
1883	Jazel's Maid 11,011	14	6	3
1884	Maggie C. 12,216	14	6	4
1883	Rose of Rose Lawn 9365	14	6	5
1884	Lady Greville 12,930	14	6	3
1883	Marpetra 10,284	14	6	2
1882	Gilda 2779	14	6	3
1881	Myth 2837	14	6	7
1881	Palestine's Last Daughter 12,602	14	6	4
1885	Palestine Pierrot 2d 24,099	14	6	6
1885	Mellie Argyle 20,609	14	6	3
	Palestine 26	14	6	
1885	Countess of Scarsdale 18,633	14	6	2
1884	Lady Fanning 11,169	14	6	6
1883	Effie of Verna 8928	14	6	6
1884	Nameless Girl 11,623	14	6	5
1883	Augerez Girl 17,015	14	6	3
1884	Jacquenetta 10,958	14	6	4
1883	Lady Clarendon 3d 17,578	14	5½	3
1883	Memento 1913	14	5	11
1883	Energy 22,016	14	5	7
1873	Lady Palestine 2769	14	5	5
1885	Lillie Pope 8589	14	5	7
1883	Milkmaid of Burr Oaks 9035	14	5	5

GROUP TWENTIETH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1883	Nancy of St. Lambert 12,964	14	5	3
1885	Moberly Creamer 23,051	14	5	3
1884	Lady Mary Hampton 4861	14	5	10
1883	Minnie of Scituate 17,829	14	4½	5
1884	Alphea Star 16,532	14	4½	2
1884	Renown 13,729	14	4½	3
1885	Lottie Rex 18,757	14	4	2
1884	Mary of Gilderoy 11,219	14	4	4
1885	Princess Mary of Woodlawn 11,663	14	4	4
1883	Violet of Glencairn 10,221	14	4	3
1885	Bertie Briggs 5213	14	4	10
1884	Leoline 2d 18,315	14	4	3
1885	Metah's Baby 9710	14	4	7
	Cigarette 2849	14	4	
	Corolla 4392	14	4	
1883	Blonde 2d 9268	14	4	5
	Nannie Fitch 9143	14	4	
1882	Buckeye Lass 10,355	14	4	5
1881	Adina 1942	14	4	9
1882	Jeannie Platt 6005	14	4	5
1883	Vespucia 17,455	14	4	3
1883	Kate Daisy 8264	14	4	6
1881	Lebanon Daughter 6106	14	4	5
	Susette 4068	14	4	
1883	Rose of Hillside 3866	14	3½	9
1880	Bintana 9837	14	3½	3
1882	Gem of Sassafras 8434	14	3½	4
1885	Halsie McCurdy 12,379	14	3½	6
1884	**Gilt Edge C.** 12,223	14	3½	2
1884	Signetilia 16,333	14	3	2
1880	Deoine 6343	14	3	3
1885	Betsona 16,776	14	3	3
1884	Fandango 12,908	14	3	3
	Pride of Winslow 2613	14	3	
1885	Embla Brick 15,690	14	3	3
1884	Minnie Lee 2d 12,941	14	3	3
1881	La Rouge 12,405	14	3	3
	Rene Noble 6191	14	3	3

GROUP TWENTIETH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1883	Adora 18,569	14	3	3
1883	Lilian Mostar 10,364	14	3	4
1883	Litza 6338	14	3	5
	Prudence of Bovina 3d 10,749	14	3	
1882	Clematis of St. Lambert 5478	14	3	6
1883	Celia Belle 5865	14	3	6
	Lucetta 6856	14	3	
1885	Monocacy Dimple 9680	14	3	6
1883	Lilly Cross 13,796	14	3	7
	Telka 8037	14	3	
	Silversides 3857	14	3	
	Prince's Bloom 9729	14	3	
1884	Lady Brown 2d 2348	14	3	14
	Chloe B. 8935	14	3	
	Turquoise 1129	14	3	
	Ida 8th 5409	14	3	
1885	Pet Rex 20,166	14	2½	2
1884	Alphetta 16,531	14	2½	2
1882	Maggie May 3255	14	2½	8
	Safrano 4568	14	2½	
1884	Bergerelia 15,546	14	2½	5
1883	Lily of Staatsburg 5427	14	2½	8
1885	Eugenie 2d 12,733	14	2	4
1884	Rosetta of Sidney 4520	14	2	1 1/12
1885	Grace's Nightingale 19,855	14	2	4
1880	Queen Fannie 10,275	14	2	4
1884	Susan ——	14	2	
1884	Rosalia of Sidney 4521	14	2	1½
1884	Tidy of St. Lambert 31,114	14	2	12
1884	Melita of Hillcrest 7054	14	2	6
1884	Vestina 2458	14	2	12
1882	Pearl of St. Lambert 5527	14	2	6
1882	Flamant 11,270	14	2	2
1881	Webster Pet 4103	14	2	6
	Fairy Queen of Verna 6817	14	2	
1883	Queen of Prospect 11,997	14	2	3
1883	Bella Delaine 10,356	14	2	4
1881	Rarity 2d 7724	14	2	4

GROUP TWENTIETH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1876	Nellie 1507	14	2	9
1881	Nightingale of Elmarch 8312	14	2	7
1881	Therese M. 8364	14	2	2
1881	Lebanon Lass 6108	14	2	5
1883	Bessie Bradford 7269	14	2	7
1883	Lady Gray of Hill Top 3d 14,642	14	2	3
	Belle Grinnell 3d 16,503	14	2	
	Angela 1682	14	2	
1885	Lernella 22,322	14	1½	2
1885	Nervine 25,932	14	1½	1⅓
1884	Hurrah Pansy 12,153	14	1½	4
1883	Peggy of Staatsburgh 2342	14	1¼	10
	Bathsheba 2556	14	1	
	Clematis 3d 6653	14	1	
1882	Creamer 2467	14	1	9
1884	Ballet Girl 18,750	14	1	2
	Taglioni 9182	14	1	
1885	Madame Argyle 19,476	14	1	4
	Flora Lee 13,294	14	1	
1885	Duchess of Argyle 4th 7571	14	1	7
1883	Robinette 7114	14	1	5
1883	Nellie Gray of Clermont 10,905	14	1	5
1885	Eva of Snipsic 17,650	14	1	3
1882	Myrtle of Ridgewood 7858	14	1	4
1880	Beauty Bismarck 4967	14	1	5
1882	Buttery 3502	14	1	7
1883	Variella of Linwood 10,954	14	1	3
1883	Walkyrie 5708	14	1	6
1884	Melody 2689	14	1	12
1883	Honeydrop 10,033	14	½	6
1884	Comtesse d'Espagna 10,308	14	½	
	Bronx 306	14	0	
1881	Bessie Bradford 3d 11,544	14	0	2
1885	Alphea Jewell 22,331	14	0	2
	Le Rosa 10,078	14	0	
	Muezzin 3670	14	0	
	Ella of Sidney 4522	14	0	1
	Litty 807	14	0	

GROUP TWENTIETH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
1884	Elinor Wells 12,068	14	0	3
1885	Putnam Belle 12,116	14	0	5
1884	Cressy of Deerfoot 15,324	14	0	7
1884	Baby Buttercup 10,888	14	0	4
1884	Birdie Le Brocq 17,263	14	0	3
1885	Nutley's Alma 13,581	14	0	6
	Fille de l'Air 2474	14	0	
1885	Carlo's Fanny 14,951	14	0	6
1882	Lady Young 16,668	14	0	4
	Lizzie C. 7713	14	0	
	Geranium 3963	14	0	
1882	Actress 2311	14	0	10
1885	Rioter's Beauty 14,894	14	0	2
	Clover Top 9910	14	0	
	Ada Minka 15,562	14	0	
1882	Nell Gwynn 9654	14	0	3
1874	Erith 4564	14	0	2
	Lily of St. Lambert 5120	14	0	
1885	Alice Donald ——	14	0	
	Starkville Beauty 4897	14	0	
1884	Pierrot's Countess 12,480	14	0	3
1877	Bounty 1606	14	0	9
1877	Pet Anna 1608	14	0	6
1882	Home Matron 6707	14	0	5
	Topsey K. 22,769	14	0	
	St. Nick's Flora 16,195	14	0	
	Lily of the Valley 7439	14	0	
	Miami Prize 8100	14	0	
	Naomi Cramer 8628	14	0	
1881	Pixie 4115	14	0	6
	Negress 7651	14	0	
1883	El Mora Mostar 15,955	14	0	2
	Abbie ——	14	0	
1884	Elite 4299	14	0	
	Darling 4th ——	14	0	
1867	Eureka McHenry 8341	14	0	7
	Edith 4th 817	14	0	
1885	Bonnie Fawn 6190	14	0	

GROUP TWENTIETH.

(*Continued.*)

		Butter Yield in Seven Days. lbs.	oz.	Age. Yrs.
	Lucilla 2735	14	0	
	Gentle of Glastonbury 4651	14	0	
	Belle of Ogden Farm 1570	14	0	
1881	Daisy of Clermont 3492	14	0	7
1881	Fidelia 5817	14	0	12
1881	Lucy Gaines' Buttercup 5058	14	0	8
1879	Witch Hazel 1360	14	0	9
1884	Vivalia 12,760	14	0	6
1878	Kitty Clover 1113	14	0	11
1881	St. Perpetua 2d 5557	14	0	4
	Rioter 2d's Venus 3658	14	0	
	Birdie 2611	14	0	
	Pansy 602	14	0	
1876	Countess of Warren 3896	14	0	5
1884	Sadie's Choice 7979	14	0	
1884	Gazelle 15,961	14	0	8
1885	Kerni Rex 13,671	14	0	
	Morlacchi 2725	14	0	
	Queen of the North 17,973	14	0	
	Village Maid 7069	14	0	
1876	Lady Brown 433	14	0	8
1885	Duchess of Manchester 20,838	14	0	3
1882	Hazalena's Butterfly 10,123	14	0	8
1878	Jessie Leavenworth 8248	14	0	4
	Gazelle of Mobile 1735	14	0	
	Jule 3640	14	0	
1881	Nordheim Creamer 9758	14	0	4
	Silver Bell 4313	14	0	
	Little Han 8004	14	0	
	Belle Atwood 5907	14	0	
1884	Belle Steuben 20,115	14	0	2
	Jennie Johnson 3d 6782	14	0	
	Gilt Edge 2d 4420	14	0	
	Bonfanti 388	14	0	
	Lady Caroline of St. Aubins 11,372	14	0	
	Spirea 3915	14	0	
	Sasco Bell 13,601	14	0	
	Mattituck 1450	14	0	

GROUP TWENTIETH. (*Continued.*)		Butter Yield in Seven Days. lbs.	oz.
	Bennie Hinman 7166	14	0
	Gilt 4th 4208	14	0
	Vesper 1395	14	0
	Undine of South East 4548	14	0
1885	Lady of Otsego 26,671	14	0
	Niobe 99	14	0

TABLE

SHOWING RATIO OF MILK TO BUTTER OF TESTED COWS.

GROUP ONE.

Three to Four Pounds of Milk to One Pound of Butter.

LANDSEER'S FANCY 2876 . . . . $3\frac{47}{100}$

GROUP TWO.

Four to Five Pounds of Milk to One Pound of Butter.

Toltec's Fancy 27,172 . . . . $4\frac{1}{5}$

Fannie Landseer 1969 5

GROUP THREE.

Five to Six Pounds of Milk to One Pound of Butter.

Ethleel 2d 32,291 . . . . **$5\frac{1}{31}$**

Hypathia 2d 14,774 . . . . $5\frac{1}{4}$

Mother Carey 11,746 . . . . $5\frac{1}{2}$

GROUP FOUR.

Six to Seven Pounds of Milk to One Pound of Butter.

Oxford Kate 13,646 . . . . . $6\frac{1}{4}$

Princess 2d 8046 . . . . $6\frac{2}{5}$

Sunset 15,130 . . . . $6\frac{1}{2}$

Oakland's Nora 14,880 . . . . $6\frac{3}{8}$

Mary Anne of St. Lambert 9770 . . . $6\frac{2}{3}$

Atlanta's Beauty 12,949 . . . . $6\frac{15}{17}$

GROUP FIVE.

Seven to Eight Pounds of Milk to One Pound of Butter.

Rosy Dream	$7\frac{1}{2}$
Pride of Mashamoquet Farm 6469	$7\frac{1}{2}$

GROUP SIX.

Eight to Nine Pounds of Milk to One Pound of Butter.

Niobe's Alpheanette 23,336	$8\frac{1}{6}$
Sweet Sixteen 10,682	$8\frac{1}{2}$
Jeannie Platt 6005	$8\frac{5}{11}$
Alice Jones 8225	$8\frac{3}{5}$
Matilda 5th 18,068	$8\frac{3}{5}$
Oakland's Cora 18,853	$8\frac{5}{9}$
Dia 13,658	$8\frac{13}{16}$
Rioter's Maggie 22,530	$8\frac{8}{9}$
Royal Princess 2370	9

GROUP SEVEN.

Nine to Ten Pounds of Milk to One Pound of Butter.

Pavon 12,485	$9\frac{1}{4}$
Mary Norton 13,052	$9\frac{1}{4}$
Oonan 1485	$9\frac{1}{4}$
Geranium 2d 7838	$9\frac{1}{3}$
Bomba 10,330	$9\frac{1}{2}$
Deletta 21,305	$9\frac{3}{8}$
Little Torment 1588	$9\frac{3}{5}$
Ida of St. Lambert 24,990	$9\frac{3}{8}$
Eurotas 2454	$9\frac{3}{8}$
Maculac 24,277	$9\frac{6}{7}$
Moss Rose of Willow Farm 5194	$9\frac{4}{5}$
Lucy Lanier 13,053	$9\frac{8}{9}$
Optima 6715	10

GROUP EIGHT.

Ten to Eleven Pounds of Milk to One Pound of Butter.

Granny's Gem 30,406	$10\frac{1}{16}$
Niobe of St. Lambert 12,969	$10\frac{1}{6}$
Daisy Morrison 14,035	$10\frac{1}{5}$
Gabrielle Champion 14,102	$10\frac{1}{5}$
Nan Day 17,192	$10\frac{1}{4}$
Masena 25,732	$10\frac{1}{4}$
Lorella 12,913	$10\frac{1}{4}$
Rose of St. Lambert 20,426	$10\frac{1}{3}$
May Fair 5184	$10\frac{3}{8}$
Inez of Ingleside 28,976	$10\frac{1}{2}$
Regina 4th 12,732	$10\frac{1}{2}$
Alberta Signal 18,611	$10\frac{1}{2}$
Dot Buttercup 16,358	$10\frac{1}{2}$
Rose of Hillside 3866	$10\frac{3}{5}$
Pandothro 22,383	$10\frac{3}{5}$
Rosaline of Glenmore 3179	$10\frac{7}{11}$
Eugenie Chouteau 6186	$10\frac{7}{10}$
Belle of Prospect 2d 14,326	$10\frac{7}{10}$
Maggie McM. 14,073	$10\frac{4}{5}$
Lady of Bellevue 7705	$10\frac{4}{5}$
Fannie Bugler 19,962	$10\frac{4}{5}$
Abbie Clay 15,702	$10\frac{5}{6}$
Quachette 17,091	$10\frac{9}{10}$
Grace Davy 8292	$10\frac{9}{10}$
Belmeda 6229	$10\frac{15}{16}$
Chrome Skin 7881	11
Flora 113	11
Dot of Bear Lake 6170	11
Rissa 16,014	11
Content of Linwood 6950	11
Flower of Glen Rouge 17,560	11
Home Matron 6707	11

GROUP NINE.

Eleven to Twelve Pounds of Milk to One Pound of Butter.

Mitten 13,368 . . . . 11 1/36	Snowdrop F. W. 16,948 . . . . 11 3/5
Tette 20,802 . . . . 11 1/16	Le Gallais Fancy 11 4/5
Vixen 7591 . . . . 11 1/12	Lesbie 9179 . . . . 11 5/9
Miss Porter 20,300 . . . . 11 1/12	Pilot's Veronica 18,917 . . . . 11 5/9
Rosa of Bellevue 6954 . . . . 11 1/9	Kosi 3431 . . . . 11 9/13
Rose of Eden 13,437 . . . . 11 1/9	Croton Maid 5305 . . . . 11 11/16
Yellow Locust 10,679 . . . . 11 1/8	Celeste Cox 12,948 . . . . 11 3/4
Lady Cloud 19,358 . . . . 11 1/6	Œnone 8614 . . . . 11 3/4
Countess Potoka 7496 . . . . 11 3/10	**Mamelle** 20,804 . . . . 11 7/11
Roland's Bonnie 2d 18,054 . . . . . . 11 1/3	Beauty Romeril 26,090 . . . . 11 5/6
Thorndale Belle 3d 10,973 . . . . . . 11 1/3	Baron's Rosette 25,988 . . . . 11 7/8
Viva Le Brocq 13,702 . . . . 11 1/3	**Mermaid of St. Lambert** 9771 . . . . 11 8/9
Fairy of Verna 3d 10,973 . . . . . . 11 1/3	**Fair Lady** 6723 . . . . 11 11/15
Fairy Queen of St. Brelades 7464 . . . 11 2/5	Golden Princess 4557 . . . . 11 11/16
Attractive Maid 16,925 . . . . 11 3/8	Lactine 10,680 12
Naiad of St. Lambert 12,965 . . . . 11 1/2	Gem of Hope 17,102 12
Marea 10,167 . . . . 11 1/2	Countess Lowndes 26,874 12
Maid of Avranches 6959 . . . . 11 1/2	Denise 8281 12
Mollie Garfield 12,172 . . . . 11 1/2	Creamer 2467 12
Hulla 7898 . . . . 11 1/2	**Carrie Lena 3d** 20,077 12
Belle Garner 23,682 . . . . 11 1/2	Belle Mardi 18,362 12
Jenny Pogis 22,984 . . . . 11 3/5	Scituate of Woronoco 18,040 12

GROUP TEN.

Twelve to Thirteen Pounds of Milk to One Pound of Butter.

Walkyrie 5708 . . . . 12 1/14	Bonnie Yost 7943 . . . . 12 1/2
Kate Gordon 8387 . . . . 12 1/8	Eupidee's Perfection 20,175 . . . . . . 12 3/5
May Blossom 5657 . . . . 12 1/6	**Percie** 14,937 . . . . 12 3/5
Les Marais Dell 20,314 . . . . 12 1/5	Nancy Lovelock 15,511 . . . . 12 2/3
Lizzie D. 10,408 . . . . 12 3/16	Lily of Maple Grove 5079 . . . . 12 2/3
Sister Rex 3194 . . . . 12 2/11	La Vivienne 1324 . . . . 12 2/3
Nightingale K. 2d 19,841 . . . . 12 1/5	Cetewayo's Silver Bell 18,592 . . . . . 12 2/3
Mary M. Allison 6308 . . . . 12 1/5	Naomi's Pride 16,745 . . . . 12 2/3
Lass of Scituate 9555 . . . . 12 1/4	Caliste of Newark 13,296 . . . . 12 2/3
Judith Coleman 13,191 . . . . 12 1/4	Maggie May 2d 12,926 . . . . 12 4/7
Lily Darling 11,713 . . . . 12 3/10	Zoe Henry 6693 . . . . 12 5/8
Jersey Belle of Scituate 7828 . . . . . 12 1/3	Nellie Darlington 5956 . . . . 12 3/4
Belle of Linwood 18,364 . . . . 12 1/3	Nancy of St. Lambert 12,964 . . . . . 12 7/11
Hilda 2d 5447 . . . . 12 1/3	Countess of Lakeside 12,135 . . . . . 12 4/5
Reception 8557 . . . . 12 1/2	Grace Felch 8291 . . . . 12 4/5
Petite Mère 8516 . . . . 12 1/3	Bintana 9837 . . . . 12 5/6
Countess Coomassie 19,339 . . . . . . 12 1/2	Fan's Grouville Beauty 10,079 . . . . 12 5/6
Glory of Elmarch 21,521 . . . . 12 1/2	Safrano 4568 . . . . 12 11/14

Alphea 171	$12\frac{9}{10}$
Thorndale Belle 5265	$12\frac{9}{10}$
Pride of Bovina	$12\frac{10}{11}$
Value 2d 6844	13
Beauty 17,414	13
Hartwick Belle	13
Enid 2d 10,783	13
Myrtle of Ridgewood 7858	13
Darling of Neatham 20,086	13
Farmer's Floss 17,773	13

GROUP ELEVEN.

Thirteen to Fourteen Pounds of Milk to One Pound of Butter.

Princess Sheila 7292	$13\frac{1}{11}$
Clover Mel 16,159	$13\frac{1}{10}$
Verbena of Fernwood 9088	$13\frac{1}{8}$
Milkweed 16,402	$13\frac{1}{5}$
Alcmena 6193	$13\frac{1}{5}$
Nora of St. Lambert 12,962	$13\frac{1}{7}$
Pixie 4115	$13\frac{1}{6}$
Oxalis 2d 15,631	$13\frac{1}{6}$
Harmony 2d 17,118	$13\frac{2}{9}$
Beauty 2076	$13\frac{1}{4}$
Gracie's Nightingale 19,855	$13\frac{1}{4}$
Marie C. Magnet 22,903	$13\frac{1}{4}$
Starkville Beauty 4897	$13\frac{1}{4}$
Lydia Darrach 4903	$13\frac{1}{4}$
Phaedra 2561	$13\frac{1}{3}$
Frances C. Magnet 22,904	$13\frac{1}{3}$
Lille Bonne 8108	$13\frac{1}{3}$
Sunny Lass 6033	$13\frac{3}{8}$
Gold Lace 10,726	$13\frac{1}{2}$
Well Done 25,987	$13\frac{1}{2}$
Purest 13,730	$13\frac{1}{2}$
Lucilla 3d 9786	$13\frac{1}{2}$
Bergerelia 15,546	$13\frac{1}{2}$
Evri 5282	$13\frac{1}{2}$
Su Lu 4705	$13\frac{1}{2}$
Grace Davy 8292	$13\frac{1}{2}$
Viva Le Brocq 13,702	$13\frac{1}{2}$
Evelina of Verna 10,971	$13\frac{1}{2}$
Kate Pansy 15,177	$13\frac{3}{5}$
Lady of the Isles 2d 16,652	$13\frac{3}{5}$
Miss Huelin 22,296	$13\frac{4}{11}$
Gardiner's Ripple 11,693	$13\frac{3}{7}$
Belle Steuben 20,115	$13\frac{4}{7}$
Meines 3d 7741	$13\frac{3}{5}$
Bonnie 2d 5742	$13\frac{7}{11}$
Melia Ann 5444	$13\frac{5}{8}$
Friz Cam 14,655	$13\frac{5}{8}$
Nancy Lee 7618	$13\frac{5}{8}$
Renini 9181	$13\frac{5}{8}$
Herberta 8811	$13\frac{5}{8}$
Rosebud of Bellevue 7702	$13\frac{2}{3}$
Ada S. 18,366	$13\frac{2}{3}$
Lady Jane of St. Peter's 7475	$13\frac{4}{6}$
Gem of St. Cloud 7342	$13\frac{4}{6}$
Cupid of Lee Farm 9365	$13\frac{5}{6}$
Ideal 11,842	$13\frac{5}{6}$
Webster Pet 4103	$13\frac{6}{7}$
Bell Rex 11,700	$13\frac{7}{10}$
Good Friday 20,081	$13\frac{7}{10}$
Cassia 2d 21,370	$13\frac{7}{8}$
Rioter Pink of Berlin 23,665	$13\frac{4}{5}$
Island Dots 17,203	$13\frac{7}{8}$
Cetewayo's Dorcas 20,827	$13\frac{6}{7}$
Princess Bowen 9699	$13\frac{5}{6}$
Nightingale of Elmarch 8312	$13\frac{9}{10}$
Hazen's Bess 7329	$13\frac{19}{20}$
Hilda A. 2d 11,120	14
Maid of the Elms 18,932	14
Nordheim Creamer 9758	14
Beulah de Gruchy 13,480	14
Lisetta Johnson 5321	14
Bella of Glencairn 10,222	14
Rozel Lass 20,268	14

TESTED COWS, AND THE SIRES AND DAMS OF TESTED COWS THAT ARE THE PRODUCT OF THE VARIOUS DEGREES OF INBREEDING.

FORMULA ONE.

Son into Dam.

BULLS.

Model Pedigree for Bulls.

		Island Bull.
	Willie Boy 434	
MARIUS 760		**Lady Mary 1148.**
	Lady Mary 1148.	

Duke of Edmeston 6919, Lord Aylmer 1067, Dick 1410.

Tested Cows.

MOSS ROSE OF WILLOW FARM 5194, **Hilda 2d** 5447, Gem of Hope 17,102, Wybie 595. Duchess of Bloomfield 3d 15,580.

Dams of Tested Cows.

MOSS ROSE OF WILLOW FARM 5194, Hattie 2d 2901, Minnie 2d 17,828, Elsie Burnside 5598.

FORMULA TWO.

Grandson into Grandam.

BULLS.

Model Pedigree.

			Welcome, F. 172.
		Hero P. 90	
	Romulus P. 181		**Musique, F. 1096.**
CETEWAYO, P. 224 J.H.B.		Stella.	
	Musique, F. 1096.		

COWS.

NIPHETA 9180.

FORMULA THREE.

Sire into Daughter.

BULLS.

Model Pedigree.

	Young Rioter 751 E. H. B.	
Stoke Pogis 1259		**Young Rioter 751 E. H. B.**
	Essay	
		Tattle.

Oxoli 1922, Raghorn 175, Bluetooth 1821, Optimus 1607, Marcot 726, New Years 4352, Jason Jr. 3270, Commodore Roxbury 1586, Thalma 4288.

KING RIOTER 6075.

AT 3 YEARS OLD.

Rioter—Stoke Pogis—Marjoram Type.

GREEN MOUNTAIN HERD.

MOULTON BROTHERS, WEST RANDOLPH, VERMONT.

TESTED COWS.

Model Pedigree for Cows.

JERSEY BELLE OF SCITUATE 7828.

- **VICTOR 3550..**
  - Pilot 3549........ ...
    - Dick Swiveller Jr. 276.
    - **Nelly 7825....**
      - *Czar* 273.
      - Dove 7824........
        - *Czar* 273.
        - Duchess 548.
  - Minnie 7826....... .
    - Dick Swiveller Jr. 276.
    - Dove 7824........
      - *Czar* 273.
      - *Duchess* 548.
- Jenny 7827..........
  - **VICTOR 3550..**
    - Pilot 3549.... ....
      - Dick Swiveller Jr. 276.
      - **Nelly 7825 ....**
        - *Czar* 273.
        - Dove 7824.........
          - *Czar* 273.
          - *Duchess* 548.
    - Minnie 7826..... ..
      - Dick Swiveller Jr. 276.
      - Dove 7824........
        - *Czar* 273.
        - *Duchess* 548.
  - *Fannie* 7823.

	Blood per ct.
Victor.........	75.
Fannie.........	25.
Dick Swiveller Jr......	37½.
Czar..................	$23\frac{7}{8}$.
Nelly............... ...	$18\frac{3}{4}$.
Duchess	$14\frac{1}{16}$.

Nymphæa 5141, Eugenie Chouteau 6186, Chroma 4572, Pyrola 4566, Nan Day 17,192, Lady Conover 2d 17,589, Beauty ——, Countess of Lakeside 12,135, Rosebud of Allerton 6352, Fair Lady 6723, Queen of Delaware 17,029, Rosy Kate

10,276, Volie 19,465, Nancy Lovelock 15,511, Gipsy May 6259, May Fair 5184, Miss Vermont 7698, Tamy 2d 7125, Tamy Lowndes 25,316, Maid of Amboy 2929, Dollie Dale 16,140, Silenta 17,685, Le Petite Mère 2d 12,810, Purest 13,730, Jefferson Albina 12,196, Lady Bloomfield 4704, Renini 9181, Moberly Creamer 23,051, Lillie Pope 8589, Vespucia 17,455, Princess Mary of Woodlawn 11,663, Lilly Cross 13,976, Lydia Darrach 2d 8056, Lydia Darrach 3d 10,662, Lydia Darrach 5th 16,577, Alphea Jewell 22,331, Safrano 4568, Lernella 22,322, Lady Ives 1708, Countess of Lorne, 20,822, Clematis 3174.

DAMS OF TESTED COWS.

Leda 799, Motto 80, Belle of Prospect 6627, Aureola 8617, Sukey 2d 1224, Nellie 7825, Irma 1298, Lady Ives 1708, Fanny 1185, Lily 857, Bell Flower 59, Martinet 6418, Rose of Salem 6476, Chess 6848, Phædra 2561.

FORMULA FOUR.

Grandsire into Grand-daughter: Pedigree of Cow.

Model Pedigree.

PUREST 13,730 (15 lbs. 4 oz., 2 years old).

- **MERCURY 432**
  - Jupiter 93
    - *Saturn* 94.
    - *Rhea* 166.
  - Alphea 171
    - *Saturn* 94.
    - *Rhea* 166.
- Nymphæa 5141, 18 lbs. 7½ oz.
  - **Mercury 432**
    - Jupiter 93
      - *Saturn* 94.
      - *Rhea* 166.
    - Alphea 171
      - *Saturn* 94.
      - *Rhea* 166.
  - Phædra 2561, 19 lbs. 13 oz.
    - **Mercury 432**
      - Jupiter 93
        - *Saturn* 94.
        - *Rhea* 166.
      - Alphea 171
        - *Saturn* 94.
        - *Rhea* 166.
    - Leda 799
      - Jupiter 93
        - *Saturn* 94.
        - *Rhea* 166.
      - Europa 176
        - Jupiter 93
          - *Saturn* 94.
          - *Rhea* 166.
        - Alphea 171
          - *Saturn* 94.
          - *Rhea* 166.

BULLS.

New Years 4352, Oxoli 1922.

TESTED COWS.

Purest 13,730, Reality 16,537, Lilly Cross 13,796, Lady Mel 429, Countess of Lorne 20,822.

DAMS OF TESTED COWS.

Lady Mel 429, Chess 6848.

FORMULA FIVE.

Brother into Sister.

BULLS.

Model Pedigree.

		Saturn 94.
	Jupiter 93...............	
		Rhea 166.
MERCURY 432......		
		Saturn 94.
	Alphea 171........	
		Rhea 166.

Victor 3550, Sidney 3262, Arnold's Bronx 3309, Alpheus 1168.

TESTED COWS.

Hilda D. 6683, Phædra 2561, Volie 19,465, Mintha 12,812, Lady Thurlow 12,410, Clytemnestra 2455, Taglioni 9182, Arletta 3d 14,274, Renini 9181, Mollie Garfield 2d 18,662, Forget-Me-Not O 10,564, Purest 13,730, Lesbie 9179, Mellie Argyle 20,609.

DAMS OF TESTED COWS.

Clytemnestra 2455, Julia of Deerfoot, Young Patricia, F. 35 H. C., grandam of Le Brocq's Prize.

FORMULA SIX.

Half-Brother into Half-Sister.

BULLS.

Hurrah 2814, sire of Value 2d 6844; **Duke of Darlington** 2460, sire of **Bomba** 10,330; **Magnetic** 1428, sire of Gilderoy 2107; **Remarkable** (F. 229 H. C.—J. H. B.); **Chief Justice 2d** 1543, Sir Samuel Cunard 2231, Paddy Wilson 3030, Ontario 865, Date 2624, Kahela 2859, Fast Boy 2606, Czar 251, King Pin 1878, Duke of Wellington 608, Guy Warwick 1450, Hector 3814, Tamerlane 4287, Abe Lincoln 268, Clive Duke 1901, Sultan of St. Saviour's 5328, Niobe Duke 2364, Brown Prince (F. 85 H. C.—J. H. B.), Diana's Rioter 10,481, Miramon 1551.

Model Pedigree.

		Tom Dasher 420.
	Colonel Crockett 1694...............	
		Capatolia 2069.
HURRAH 2814......		
		Tom Dasher 420.
	Village Girl 5744......................	
		Mary Goodenough 2068.

Model Pedigree and Chart of Hurrah.

TESTED COWS.

Ida of St. Lambert 24,990, Oakland's Nora 14,880, Jersey Queen of Barnet ——, Pet of Rose Lawn 11,326, Island Star 11,876, Conover's Beauty 12,650, Butter Star 7799, Ideal Alphea 18,755, Lady Cloud 19,358, Herberta 8811, Lady Bidwell 10,303, Idaletta 11,843, Lerna 3634, Le Brocq's Curfew 30,697, Lady Hayes 10,136, **Carrie Lena 3d** 2077, Idalene 11,841, Sunset 15,130, Pierrot's Lady Hayes 11,672, Dia 13,658, La Belle Petite 5472, Deoine 6343, Naomi's Pride 16,745, Dolly of Lakeside 10,824, Pride of the Hill 4877, Gem of Sassafras 8434, Litza 6338, Robinette 7114, Lucy Gaines' Buttercup 5058, Nellie Darlington 5956, Buttery 3502, Aleph Judea 11,389, Estrella 2831, Iola 4627, Verbena of Fernwood 9088, Farmer's Floss 17,773, Jennie Pogis 22,984, Marie C. Magnet 22,903, Maple Leaf 4768, Phyllis of Hillcrest 9067, Amra 9590, Mink 2548, Rioter's Nora 21,778, Tidy of St. Lambert 31,114, Aspirante 9272, Honeydrop 10,033, Bounty 1606, Topsy K. 22,769, Matilda 2408, Bonnie Fawn 6190, La Petite Mère 3d 12,814, Madame Argyle 19,476.

DAMS OF TESTED COWS.

YOUNG FANCY 97, dam of **LANDSEER'S FANCY** 2876; Kathleen of St. Lambert 2122, dam of **Ida of St. Lambert** 24,990; Coreopsis 4188, dam of Arnold's Lulu 7328; Princess Royal 2d 1005, Arletta 14,264, Monmouth Duchess 2d 4619, Miss Seelock 6614, Pussy Baker 6994, Fannie Booth 12,505, Juliet of St. Lambert 5483, Mink 2548, Pet of St. Lambert 5123, Camelia of St. Lambert 5106, May Day of St. Lambert 5109, Bessy of St. Lambert 5248, Lima 2d 3082, Minka 951, Warren's Duchess 4622, Flora Hinman 272, Rarity 5923, Edith 4th 817, Marietta 1813, Cora K. 22,768, Hecuba 3155; Violetta, dam of Violet 3d 3240; Monmouth Duchess 2d 1005; Matilda 2405, dam of Maud Lee 2416; Zina 3d, dam of Hazen's Bess 7329; Beauty of Darlington 5736, dam of **Bomba** 10,330; Nelly 6456; Witch of St. Lambert 5479, dam of Cowslip of St. Lambert; Magnet, dam of Marjoram 3239; Lilly 2578, dam of bull Beeswax 1931.

FORMULA SEVEN.

Uncle into Niece.

BULLS.

Alpha of Clifton 1824, sire of Niobe's Alpheanette 23,336; Aventurier 4254, sire of **Pet of Rose Lawn** 11,326; Dash of Glastonbury 1959.

TESTED COWS.

Model Pedigree.

ETHLEEL 2d 32,291 (30 lbs. 15 oz. at 32 months old).

- **Lord Harry 3445**........
  - **Top Sawyer 1404**... ....
    - Marius 760.........
      - *Willie Boy* 434.....
        - ———
        - *Lady Mary* 1148.
      - *Lady Mary* 1148.
    - *Emblem* 90.........
      - *Clement* 115.
      - ———
  - Duchess of Bloomfield 3653 ... ... 20 lbs. 0½ oz.
    - *Rioter* 670.
    - Angela 1682.... ...
      - Roxbury 247.
      - Europa 121.
- **Ethleel 18,724**.......... 19 lbs. 14.oz.
  - *Tormentor* 3533....
    - Khedive, P. 103 J. H. B..........
      - Leo, F. 98 J. H. B.—H. C.
      - *Coomassie* 11,874.
    - Angela, F. 1607 J. H. B.
  - Beeswax 9807......
    - **Top Sawyer 1404**... ....
      - Marius 760.........
        - *Willie Boy* 434.....
          - ———
          - *Lady Mary* 1148.
        - *Lady Mary* 1148.
      - *Emblem* 90.. .....
        - *Clement* 115.
        - ———
    - Bisma 3d 1870.

TESTED COWS.

Ethleel 2d 32,291, Monmouth Duchess 4th 7129, Belle of Prospect 2d 14,326, Lady Gray of Hill Top 6850, Phædra 2561, Colie 8309, Nida 2d 8227, Renalba 4117, Zitella 2d 11,922, Warren's Duchess 4622, Ceccola 13,608, Lady Louise 4339, Purest 13,730, Malope 2d 11,923, Royal Sister 12,457, Monmouth Duchess 3d 4620, Renown 13,729, Moonah's Pet 7484, Lerna 3634, Niobe of Linwood 11,134, Lady Louise 4339, Alphea Star 16,532, Maculac 24,277, Belle Garner 23,682.

DAMS OF TESTED COWS.

Value 5433, dam of **Value 2d** 6844; Magnet, dam of Marjoram 3239; La Petite Belle 12,807, Monmouth Duchess 2d 4619, Monmouth Duchess 3d 4620; Lady Mel 429, dam of Lady Mel 2d.

FORMULA EIGHT.

Nephew into Aunt.

BULLS.

GILDEROY 2107; **Pedlar** 631, E. H. B., sire of Rioter 746, E. H. B., and grandsire of Rioter 2d 469, and Dolphin 2d 468, double g. grandsire of Stoke Pogis 1259.

Model Pedigree.

GILDEROY 2107	Magnetic 1428	*Islander* 561	*John Le Bas* 398.
			Ida 1441.
		Azalea 1443	*John Le Bas* 398.
			Nellie 289.
	Jeanne Le Bas 2476 15 lbs. in 7 days.	*John Le Bas* 398	Conqueror, F. 85 J. H. B.
			Patricia, F. 189 J. H. B.
		Dairy Pride, F. 348 J. H. B.	Prince of Wales.
			Glory.

Prince of Wales bred to his dam Duchess, F. 24 J. H. B., produced Patricia, F. 189 J. H. B., dam of John Le Bas.

Jeanne Le Bas 2476 is also the product of the same formula as her son Gilderoy.

Champion of America 1567; Pacha (64 J. H. B.), sire of Regina 4th 12,732; Carlo 5559.

TESTED COWS.

Melia Ann 5444, Jeanne Le Bas 2476, Rosa Miller 4333, Maud Melinda 12,126, Pride of Bovina 8050, Jersey Cream 3d 8521, Trudie 277, Young Garenne 3d 13,648, Saragossa 22,019, Violet 3d 3240, Queen of De Soto 12,318, Dolly of

Lakeside 10,284, Mintha 12,812, Lobelia 2d 6650, Minnie of Scituate 17,829, Pride of the Hill, 4877.

DAMS OF TESTED COWS.

Trudie 277, Bessie Allen 3719, Helvetia ——, Melia Ann 5444.

FORMULA NINE.

Grand-Nephew into Grand-Aunt.

BULLS.

Model Pedigree.

- **ROYALIST 2906, P. 139 J. H. B.—H. C.**
  - **Sweepstakes Duke** 1905 Duke P. 76 J. H. B.—H. C. 1st prize.
    - Merry Boy, P. 61.—H. C.
      - Stockwell 2d, P. 24.—H. C.
        - Noble, F. 104.—H. C.
        - Soucique, F. 68.—C.
          - **Noble.** 1st prize.
      - Eva, F. 628.—C.
    - Superb, F. 353.—H. C.
      - Prince of Wales. 1st prize.
        - **Noble.** 1st prize.
        - Duchess, F. 24.—H. C.
      - Lily, F. 354.—C.
        - Tom. 1st prize.
        - Flower, F. 53.—H. C.
  - **Regina,** F. 32 J. H. B.—H. C. 1st prize 4 yrs.
    - **Noble.** 1st prize.
    - Mignonne. 1st prize.

ROYALIST 2906, Stockwell 2d (P. 24 H. C.—J. H. B.), Carlo 5559, Ida's Rioter of St. Lambert.

TESTED COWS.

SULTANE 2d 11,373, Chrome Skin 7881, Regina 4th 12,732, Honeysuckle of St. Anne's 18,674, Bessie Ridgely 8293, Regina 2d 2475, Queen of Ashantee 14,554, Maggie Rex 28,023, Duchess of Argyle 4th 7571.

FORMULA TEN.

Cousin into Cousin.

BULLS.

Model Pedigree.

		Rob Roy 17.	
	Colt Jr. 825		
			Rhodes' Bull 824.
		Maggie 2054	
			Bradley Cow 2052.
REX 1330			
		Albert 44.	
	Couch's Lily 3237		
			Taintor's Bull.
		Lily Dale 3236	
			Bradley Cow 2052.

REX 1330, Auchentorolly 3494, Tormentor 3533.

TESTED COWS.

FLOWER OF GLEN ROUGE 17,560, Nelly 6456, Viva Le Brocq 13,702, Countess Potoka 7496, Obella B. 10,575, Oak Leaf 4769, Dia 13,658, Cordelia Baker 8814, Silver Rose 4753, Signal Maid 19,361, Princess Sheila 7297, Fear Not 2d 6061, Louvie 3d 6159, Lady Gray of Hill Top 2d 14,641, Lady Gray of Hill Top 3d 14,642, Chloe Beach 3931, Moss Rose of St. Lambert 5114, Jessie Lee of Labyrinth 5290, El Mora Mostar 15,955, Lucy Gaines' Buttercup 5058, Olie's May Belle 6567, St. Jeannaise 15,989, Miss Willie Jones 6918, Como Lass 24,369, Ada S. 18,366.

DAMS OF TESTED COWS.

Lolly of St. Lambert 5480, dam of **Mary Anne of St. Lambert** 9770, **Naiad of St. Lambert** 12,965, and Crocus of St. Lambert 8351.

ADDITIONAL TESTS TO JERSEY FOUNTAINS.

The following totals have been added since the forms were cast:

Comus 54, 50 cows; Alphea 171, 92 cows; Rioter 746 E. H. B., 56 cows; Rioter 2d 469, 21 cows; Rioter 670, 15 cows; Victor Hugo 197, 49 cows; Pauline

494, 40 cows; Angela 1682, 11 cows; Albert 44, a daughter, 132 cows; Pansy 8, 165 cows; Clement 115, 120 cows; McClellan 25, 72 cows.

LADY MARY 1148.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Empress of Ely 2d 6771	25	16 lbs. 8 oz.
Gladys of Bellevue 9569	25	16 " 7 "
La Fantine 14,489	$18\frac{3}{4}$	15 " 4 "
Lizzette's Mary 12,723	$17\frac{3}{16}$	14 " 11 "
Rochelle 15,574	$9\frac{3}{8}$	15 lbs. 10 oz.
Duchess of Bloomfield 3d 15,580	$9\frac{3}{8}$	15 " 1 "
Total, 102 *cows.*		

MARIUS 760.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
La Fantine 24,489	25	15 lbs. 4 oz.
Duchess of Bloomfield 3d 15,580	$12\frac{1}{2}$	15 " 1 "
Rochelle 15,574	$12\frac{1}{2}$	15 lbs. 10 oz.
Lizzette's Mary 12,723	$6\frac{1}{4}$	14 " 11 "
Total, 90 *cows.*		

Lawrence 61, 24 cows; Lord Lisgar 1066, 43 cows; Top Sawyer 1414, 21 cows; Rex 1330, 26 cows; Couch's Lily 3237, 30 cows.

LORD LAWRENCE 1414.

Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Gladys of Bellevue 9569	50	16 lbs. 7 oz.
Empress of Ely 2d 6771	25	16 " 8 "
Lizzette's Mary 12,723	25	14 lbs. 11 oz.
Total, 11 *cows.*		

MEASUREMENTS OF LANDSEER'S FANCY 2876.

The following points relating to the cow Landseer's Fancy 2876 were received too late for insertion in their proper place:

She has a deep yellow skin and the deepest yellow ear. Her length is 87 inches; girth at heart, 70 inches; at navel (in calf six months), 85 inches; girth in front of udder, 75 inches.

Breadth across hips, $20\frac{1}{4}$ inches.

Length of quarter from point of hip to first joint of tail, $21\frac{1}{2}$ inches.

Her weight is estimated at 950 pounds.

STUDY OF THE TABLES.

Not all of the products of inbreeding are shown under the preceding ten formulas.

There are many great animals produced by the union of two or more closely inbred lines, as Mary Anne of St. Lambert 9770. Her sire, Stoke Pogis 3d 2238, was the product of Stoke Pogis 1259, the fruit of forty years of inbreeding, culminating in the formula of sire into daughter, and Marjoram 3239, bringing back two lines of the same Dauncey Herd blood as that of Stoke Pogis. They were both fine animals, the one the best descendant of the original Dauncey herd, and Marjoram the best heifer bred by Mr. Duncan, from a long line of inbreeding.

Lolly of St. Lambert 5480, dam of Mary Anne of St. Lambert, was the product of three lines of Victor Hugo 197, a union of half-brothers and half-sisters.

St. Helier 45 and Albert 44 are claimed to be the result of forty years of close inbreeding on the Island of Jersey.

It will be observed that the best models, bulls and cows, are the product of inbreeding. Some who have strong prejudices against inbreeding, and have made but a very superficial study of the subject, have assumed to show the contrary, that inbreeding does not produce the finest or best specimens. One writer in Mr. Campbell Brown's "Butter Tests" declares inbreeding to be wrong, and has made a table by which he endeavors to show that the great cows are necessarily "outbred," and makes apparently a very good showing by counting all the cows of which he does not happen to know the pedigree as "outbred," yet all but two of his table of so-called outbred animals have pedigrees so short or incomplete that it cannot be said of any of them that they are not inbred, while several of them have the names of strongly inbred animals in their pedigrees within one, two, or three generations. The breeding of **Ethleel 2d** 32,291 is credited to the writer of that article! I have arranged the ten formulas in the order, as I believe, of their importance. When we have but two or three examples of formula number one, son into dam, it is hardly fair to challenge this formula with its meagre opportunities for exhibition, to rival the world in opposition. The single instance of **Marius** 760 is a good showing, as also that of **Chief Justice 2d** 1643, the former having ninety descendants among the tested cows, and the latter producing from his dam the great cow **Hilda 2d,** yielding twenty-three pounds five ounces in seven days. When a few of the strong model cows shall have been bred to their sons and grandsons, and some not very remote generations of butter tests accumulated, it will be a better time than the present to compare the results of inbreeding with those of outbreeding.

Outbred animals, however, must eventually become improved as the whole breed feels the influence of selection and careful inbreeding.

I would still say, put a good inbred bull at the head of your herd. My idea of a good bull is that he should be the grandson of his dam, and she a twenty-five-pound standard or grass-test cow, and perfect in every point. To inbreed mediocrity and inferiority is as reprehensible as the inbreeding of consummate excellence is commendable.

INBREED TO THE WINNER.

The table of Standard Tests and the whole of the groups of cows showing richness of milk will greatly aid breeders in the selection of choice pedigree stock for the foundation of herds or the perfection of lines already established.

THE FUTURE OF AMERICAN JERSEYS.

The breeder who will first show a herd in which every animal shall have been bred by himself, each of the cows having an official test of twenty pounds a week or upward, will effectually demonstrate that breeding is a science, and not the result of chance and hazard.

The stability of the dairy industry and the breeding of choice dairy stock is fixed upon the basis of the progressive civilization of the age. Wherever this industry is cherished it is attended by all the outward evidences of prosperity: improvement in dwellings, better schools, sanitary farm buildings, labor-saving farm apparatus; while the very best strains of Jersey cattle take the place of all inferior breeds.

Articles produced by the best dairies that are now considered table luxuries must soon become staple articles of food, and the home demand for dairy products must increase, so that all, or nearly all, of our products will be consumed at home. The income from the dairy must always be sure, and the amount of that income will be increased according to the excellence of quality in the products. The increase of population is so great and rapid that the breeding of choice Jerseys can never supply the demand, consequently there will always be room, for all those who have the requisite education and skill, to embark in the enterprise of Jersey breeding, with an absolute assurance of success. Judging by the past, we take our measure of what the future will be.

Straight onward will be the development of the Jersey interest. The popularity of the Jersey can never be less, but ever an increasing tide. Dotting every hillside and sprinkling every valley, the herds will grace the landscape with beauty, over this vast continent, from Labrador to Mexico, and will yet play an important part in the higher civilization of the latter as well as our own country. With better

methods in agriculture and in dairying, with better practice in the breeding and management of cattle, with improved medical and sanitary treatment, and a higher standard of excellence in the quality of herds, the Jersey breeders of America have an auspicious prospect of grand achievements before them, which we await with hopeful anticipation.

I close this volume with the admonition to American farmers to cherish the Jersey cow as the best foster-mother of the human race, a boon bestowed by our Father to show His beneficent care for the comfort of our earthly pilgrimage.

GENERAL INDEX.

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INDEX TO JERSEY FOUNTAINS.

BULLS.

Total, 124 *bulls.*

COWS.

A.

Alphea 171, 507, 699.
Angela 1682, 538.
Azelda 3872, 571.

C.

Coomassie 11874, 544.
Couch's Lily 3237, 534, 586, 699.
Countess 114, 493.

D.

Dandelion 2521, 528.
Dazzle 379, 518.

E.

Emblem 90, 528, 586, 699.
Eurotas 2454, 543.

F.

Flora 113, 492.

J.

Jersey Belle of Scituate 7828, 545.

L.

Lady Mary 1148, 521, 585, 699.
Lady of the Isles, F. 992, 538.
Landseer's Fancy 2876, 557.
Lucky Belle 2214, 552.

M.

Marjoram 3239, 552.
Mary Anne of St. Lambert 9770, 583.
Mary Lowndes 273, 503.
Masena 25732, 578.
Mink 2548, 553.
Mollie Garfield 12172, 589.
Mostar 6971, 574.

N.

Nancy Lee 7618, 579.
Nelly 55, 517.

O.

Oonan 1485, 543, 586.
Oxford Kate 13646, 583.

P.

Pandora of Staatsburg 3d 6497, 582.
Pansy 8, 494, 584.
Pansy 6th 38, 506, 585.
Pansy 1019, 517.
Pauline 494, 527, 699.
Pride of Windsor 483, 626.
Princess 836, 502.
Princess 2d 8046, 581.

R.

Regina, P. 32, J. H. B., 507.

Total, 36 *cows.*

INDEX TO TABLE OF STANDARD TESTS.

INDEX TO OFFICIAL TESTS OF A. J. C. C.

INDEX TO SEVEN-DAY TESTS.

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1874.

HOMER H. 3683.*

Color, fawn and white ; star ; white on hind legs and fore feet ; scrotum tipped black. Dropped May 10th, 1874. Bred by G. W. Homer, Framingham, Mass. Sire, The Squire 1298. Dam, Gilda 2779.

TESTED DESCENDANTS

Name.	Blood, Per Cent.	Butter Yield in Seven Days.	Name.	Blood, Per Cent.	Butter Yield in Seven Days.
Jenny Dodo H. 14,448	50	21 lbs. 8 oz.	Mercedes H. 12,326	50	17 lbs. 12 oz.
Zophar H. 12,329	50	21 " 3 "	Anita H. 12,324	50	17 " 4 "
Willimenia H. 12,325	50	20 " 14 "	Theresa H. 14,447	50	15 " 3 "
Madolina H. 12,327	50	19 " 4 "	*Total, 7 cows.*		

* Addenda to Jersey Fountains, page 565. Last six names not in Index.

OMISSION, PAGE 664.

Favorite of the Elms 1656................Yield of Butter in Seven Days, 16 lbs. 4 oz.